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Contents

A Morphological Operator Based Approach To Detect Background From Darken Images

Priyanka[1], Manoj Arora[2]
[1]Student , ECE Deptt. JMIT, Radaur.
[2]Asstt. Prof., JMIT, Radaur.

A B S T R A C T

This proposal deals with the detection of background in images with poor contrast. Some morphological transformations are used to detect the background in images characterized by poor lighting. Lately, contrast image enhancement has been carried out by the application of two operators based on the Weber's law notion. The first operator employs information from block analysis, while the second transformation utilizes the opening by reconstruction, which is employed to define the multi-background notion. The objective of contrast operators consists in normalizing the grey level of the input image with the purpose of avoiding abrupt changes in intensity among the different regions. Finally, the performance of the proposed operators is illustrated through the processing of images with different backgrounds, the majority of them with poor lighting conditions. The contrast enhancement problem in digital images can be approached from various methodologies, among which is mathematical morphology (MM). Such operators consist in accordance to some proximity criterion, in selecting for each point of the analyzed image, a new grey level between two patterns (primitives).

Keywords: Morphological Operators, Background, Sepration, Enhancement

I. INTRODUCTION

Contrast enhancement is an important task in image processing that is commonly used as a preprocessing step to improve the images for other tasks such as segmentation. However, some methods for contrast improvement that work well in low-contrast regions affect good contrast regions as well. This occurs due to the fact that some elements may vanish. The proposed method is based on morphological transformations by reconstruction and rational operations, which, altogether, allow a more accurate contrast enhancement resulting in regions that are in harmony with their environment. Furthermore, due to the properties of these morphological transformations, the creation of new elements on the image is avoided. As a result of the previous considerations, the proposed method keeps the natural color appearance of the image.

The contrast function enhances the contrast of an image. It creates a new gray colormap, cmap, that has an approximately equal intensity distribution. All three elements in each row are identical. cmap = contrast(X) returns a gray colormap that is the same length as the current colormap.

The two contrast enhancement operators used in the proposed methodology are:- Block Analysis and Opening by reconstruction methods. These are discussed in the following subsections.

A) Block Analysis method

It is a method in which we divide the image into various sub images and then apply operations on them for contrast improvement. In the proposed methodology, d represent the digital space under study, with $d = z * z$ and z is the integer set. Each block is the sub image of the original image. The maximum and minimum intensity values are denoted as M_i and m_i. For each analyzed block, maximum (M_i) and minimum (m_i) values are used to determine the background measures. T_i is used to select the background parameters. Background parameters line between clear ($f > T_i$) and dark ($f <= T_i$) intensity levels and dark intensity levels. Once T_i is calculated, this value is used to select the background parameter associated with the analyzed block. If ($f <= T_i$) is the dark region then background parameters takes the maximum intensity levels (M_i) then ($f > T_i$) is the clear region, background parameters takes the minimum intensity levels (m_i).

B) Opening By Reconstruction method

The normal morphological opening is an erosion followed by a dilation. The erosion "shrinks" an image according to the shape of the structuring element, removing objects that are smaller than the shape. Then the dilation step "regrows" the remaining objects by the same shape. The dilation step in the opening operation restored the vertical strokes, but the other strokes of the characters are missing. How can we get the entire characters containing vertical strokes. The answer is to use morphological reconstruction. For binary images, reconstruction starts from a set of starting pixels (or "seed" pixels) and then grows in flood- fill fashion to include complete connected components. To get ready to use reconstruction, first define a "marker" image. This is the image containing the starting or seed locations.

Consider a transformation ψ acting on sets consisting, first, of measuring an increasing criterion such as the area or the Ferret's diameter of each connected component of the input sets and, second, of keeping only the connected components for which the criterion is higher than a given limit. A typical example of this filter is area opening. To find the function that matches the background images without dividing the original images into blocks, and also without using erosion and dilation method. When structural element increases, morphological end generate new shapes. Erosion and dilation are used with large size to expose the background. However, in MM, there is other class of transformations that allows the filtering of the image without generating new components; these transformations are called transformations by reconstruction When considering the opening by reconstruction to detect the background, one further operation is necessary to detect the local information given by the original function (image extremes are contained in the opening by reconstruction because of its behavior).

II. LITERATURE SURVEY

I.R. Terol-Villalobos[1] has presented a multi scale image approach for contrast enhancement and segmentation based on a composition of contrast operators. The contrast operators are built by means of the opening and closing by reconstruction. The operator that works on bright regions uses the opening and the identity as primitives, while the one working on the dark zones uses the closing and the identity as primitives. To select the primitives, a contrast criterion given by the connected top hat transformation is proposed. This choice enables us to introduce a well-defined contrast in the output image. By applying these operators by composition according to the scale parameter, the output image not only preserves a well-defined contrast at each scale, but also increases the contrast at finer scales. Because of the use of connected transformations to build these operators, the principal edges of the input image are preserved and enhanced in the output image. Finally, these operators are improved by applying an anamorphosis to the regions verifying the criterion. Angélica R. Jiménez-Sánchez, Jorge D. Mendiola-Santibañez[2] has described that some morphological transformations are used to detect the background in images characterized by poor lighting. Lately, contrast image enhancement has been carried out by the application of two operators based on the Weber's law notionfi. rThe st operator employs information from block analysis, while the second transformation utilizes the opening by reconstruction, which is employed to dfine the multibackground notion. The objective of contrast operators consists in normalizing the grey level of the input image with the purpose of avoiding abrupt changes in intensity among the different regions. Finally, the performance of the proposed operators is illustrated through the processing of images with different backgrounds, the majority of them with poor lighting conditions. I. R. Terol[3] has also presented a paper in which the quantification of the contrast is based on the analysis of the edges, which are associated with substantial changes in luminance. Due to this, the contrast measure is used to detect the image that presents a high visual contrast when a set of output images is analyzed. The set of output images is obtained by application of morphological contrast mappings with size criteria. These contrast transformations are defined under the notion of partitions generated by the set of flat zones of the image; therefore, they are connected transformations. In addition, an application to the segmentation of white and grey matter in brain magnetic resonance images (MRI) is provided. The detection of white matter is carried out by means of a contrast mapping with specific control parameters; subsequently, white and grey matter are separated and their ratio is calculated and compared with manual segmentations. Also, an example of segmentation of white and grey matter in MRI corrupted by 5% noise is presented in order to observe the performance of the morphological transformations proposed in this work. Alexander Toet[4]: He presented a method to merge images from different sensing modalities for visual display, which produces a fused image by nonlinear recombination of the ratio of low-pass (RoLP) pyramidal decompositions of the original images. The appearance of merged images that are produced by this scheme is highly dependent on the

contrast and mean gray level of the input images. That nonlinear multiplication of the successive layers of a ratio of low pass pyramid results in a contrast-enhanced image representation that is highly invariant for changes in the global ray-level characteristics of the original image is shown. Application of this nonlinear multiplication procedure in the image fusion process results in composite images that appear highly independent of changes in lighting and gray-level gradients in the input images. The method is tested by merging different degraded versions of parallel registered thermal (FLIR) and visual (CCD) images. S. Mukhopadhyay and B. Chanda[5] has presented a scheme for enhancing local contrast of raw images based on multi scale morphology. The conventional theoretical concept of local contrast enhancement has been extended in the regime of mathematical morphology. The intensity values of the scale-specific features of the image extracted using multi scale top hat transformation are modified for achieving local contrast enhancement. . Locally enhanced features are combined to reconstruct the final image. The proposed algorithm has been executed on a set of raw images for testing its efficacy and the result has been compared with that of other standard methods for getting idea about its relative performance.

Jerzy Kasperek[6] has presented a paper which describes the implementation of the real time local image contrast enhancement method. The system is based on Virtex FPGA chip and enhances the angiocardiographic data using the modified mathematical morphology multi scale Top Hat transform. The morphological Top Hat transform proved its effectiveness but the direct real time pipeline implementation of the multi scale version requires too many memory blocks. The author proposes a slight modification of the algorithm and presents satisfactory image contrast enhancement results and an efficient FPGA implementation. Proposed pipeline architecture uses the structural element decomposition and employs the Virtex Block Ram modules effectively. The processing kernel realises the contrast enhancement for the 512 x 512 image data with 8 bits/pixel representation in the real time in one XCV-800 Virtex chip.

P. Salembier and J. Serra[7] have dealt with the notion of connected operators. Starting from the definition for operator acting on sets, it is shown how to extend it to operators acting on function. Typically, a connected operator acting on a function is a transformation that enlarges the partition of the space created by the flat zones of the functions. It is shown that, from any connected operator acting on sets, one can construct a connected operator for functions (however, it is not the unique way of generating connected operators for functions). Moreover, the concept of pyramid is introduced in a formal way. It is shown that, if a pyramid is based on connected operators, the flat zones of the functions increase with the level of the pyramid. Eli Peli[8] has presented discussed on the topic, contrast in complex images. The physical contrast of simple images such as sinusoidal gratings or a single patch of

light on a uniform background is well defined and agrees with the perceived contrast, but this is not so for complex images. Most definitions assign a single contrast value to the whole image, but perceived contrast may vary greatly across the image. Human contrast sensitivity is a function of spatial frequency; therefore the spatial frequency content of an image should be considered in the definition of contrast. In this paper a definition of local band-limited contrast in images is proposed that assigns a contrast value to every point in the image as a function of the spatial frequency band. For each frequency band, the contrast is defined as the ratio of the bandpass-filtered image at that frequency to the lowpass image filtered to an octave below the same frequency (local luminance mean). This definition raises important implications regarding the perception of contrast in complex images and is helpful in understanding the effects of image-processing algorithms on the perceived contrast. A pyramidal image-contrast structure based on this definition is useful in simulating nonlinear, threshold characteristics of spatial vision in both normal observers and the visually impaired. James Short, Josef Kittler and Kieron Messer[9] :- As an extension to prior work by the authors in the area of photometric normalisation for face verification, they apply these algorithms in a component-based framework. In particular, they investigate how the requirement for complexity of the normalisation changes when smaller image patches are used. They show that for smaller image patches, a simpler normalisation can out-perform a more complicated method. In addition, they show that a method that applies a simpler normalisation to a number of smaller face image components that are then fused, out-performs a more complicated method applied to the full face image.

III. PROPOSED WORK

Morphological operators often take a binary image and a structuring element as input and combine them using a set operator (intersection, union, inclusion, complement). Theyprocess objects in the input image based on characteristics of its shape, which are encoded in the structuring element. Usually, the structuring element is sized 3×3 and has its origin at the center pixel. It is shifted over the image and at each pixel of the image its elements are compared with the set of the underlying pixels. If the two sets of elements match the condition defined by the set operator (e.g. if the set of pixels in the structuring element is a subset of the underlying image pixels), the pixel underneath the origin of the structuring element is set to a pre-defined value (0 or 1 for binary images). A morphological operator is therefore defined by its structuring element and the applied set operator. For the basic morphological operators the structuring element contains only foreground pixels (i.e. ones) and `don't care's'. These operators, which are all a combination of erosion and dilation, are often used to select or suppress features of a certain shape, e.g. removing noise from images or selecting objects with a particular direction.

We will explain the methodology used for the concept proposed. The block diagram of the proposed methodology and explanation of steps is given below.

Steps to perform

Firstly we perform image acquisition i.e. acquire image, which has poor lightning or dull, from a specified place. Then in second step we separate the background from the image. For this we will assume that the contrast of the image is more than the normal contrast or we can say that the threshold of the image is greater than the normal value. Here, the basic idea is to select a set of training images which look good perceptually, next a Gaussian mixture model for the color distribution in the face region is built, and for any given input image, a color tone mapping is performed so that the color statistics in the face region matches the training examples. In this way, even though the reported algorithms to compensate changes in lighting are varied, some are more adequate than others. In third step, morphological operations are applied on the image such as erosion, dilation, opening and closing to see the exact location of foreground image.

Then in the next step, we segment the image into sub-images. As the source image is difficult to deal with in a general view. Thus we decompose it into simpler ways in this processing stage. The decomposed sub-images are processed by a morphological filter to emphasize the character region and suppress the small islands of noises. Finally the sub- images are united to obtain the resulting image. Image background approximation is done with the help of block analysis method. Then the next methodology i.e. opening by reconstruction is used for mutibackground notion. It is used given its following properties:

a) it passes through regional minima, and b) it merges components of the image without considerably modifying other structures. In the final step, we enhance the image by various functions like image sharpening etc. By doing this, finally our image will be of good contrast and free from bad lightning.

IV. RESULTS

In this, some snapshots of image enhancement process are shown here. In these snapshots, you can see the variation in graphs of different morphological operations i.e. erosion, dilation, opening and closing. You can also see the variation in contrast of original image after applying contrast enhancement operators i.e. block analysis and opening by reconstruction methods. Then you can compare the histograms of the original image and contrast improved image by seeing their results.

The original image which we call as image1 is shown as:-

Fig 1:- Original image (image1)

The histogram of this image is shown as:-
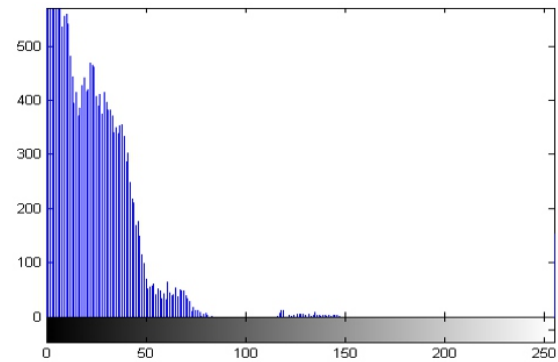
Fig 2:- Histogram of original image (image1)

The graphs of the morphological operations applied on the original image are shown as follows:-

Graph of Erosion operation applied on original image is shown as:-
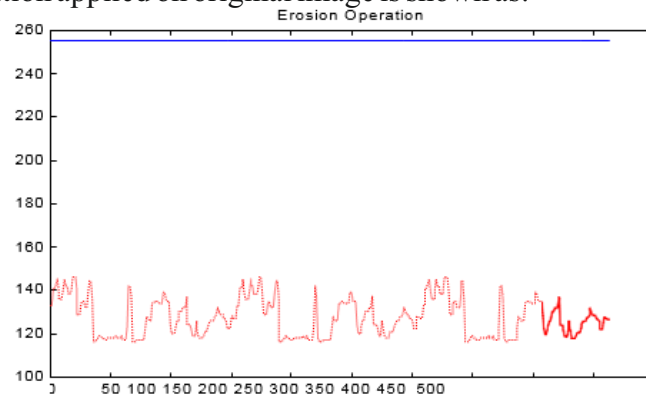
Fig 3:- Plotting of original image (image1) Vs erosion operation on original image (image1)

The result obtained from the proposed approach is shown in figure 4. As we can see we get the enhanced image from the work.

Fig 4:- Contrast improvement operation on image (image2)

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Awareness and Security Issues Regarding The Non Adoption of Net Banking Among Non Users

Meenakshi Kharb[1], Dr Jayender Verma[2]

[1](Research Scholar), Faculty of Management Studies, Organization: Manav Rachna International University, Faridabad, Haryana India

[2]Assistant Professor, Organization: Faculty of Management Studies, Manav Rachna International University, Faridabad, Haryana India

A B S T R A C T

In world of apps and emails, use of technology plays an important role in day to day work life of consumers. Initially, people had some fear in their minds regarding the use of any new technology such as mobile, ATM, internet and its applications. The net banking is vital concept for both the consumers and banks because it is advantageous in terms of time and money savings. There are some barriers regarding the awareness of net banking among consumers. This paper is to analyse two important issues regarding the non adoption among the non users. The data is collected from 120 non- users from the NCR region where aggregative analysis of the primary and secondary information. We can conclude from the analysis that unawareness of internet banking benefits; lacks of internet accessibility, security are the main issues regarding the non adoption of net banking among non-users.

Keywords: Internet banking, unawareness, security, non-adoption, non users.

1. INTRODUCTION

As India is taking giant leaps towards globalization, Internet banking is the sector to be studied with great interest. The question of how attitude towards elements of existing banking service might influence the consumer's decision to use internet banking has not been investigated (Devlin, 2003). As consumers get more and more educated, getting insight about modern banking, via Internet banking has evolved as primary area of concern for all leading and upcoming banks in India. But still, unawareness regarding the net banking benefits and security and risk associated with internet banking adoption among non-users.

2. REVIEW OF LITERATURE

A number of researches have been conducted on net banking and its adoption, development and its perils. Due to shortage of time and resources, a review of all the past researches done is mentioned in this research study. So, a snapshot of some of the reviews has been presented.

Guru et al (2000) examined the different electronic means utilized by the local banks in Malaysia to

identify the consumer's reactions to these delivery channels. It was analysed that internet banking was nearly absent in Malaysian banks due to lack of insufficient legal framework and security concerns. However, over 60% of the respondent's access the internet at home and thus represented a positive indication for PC based and internet banking in future.

Suganthi et al (2001) analysed Malaysian banking sites and revealed that all domestic banks were having a web presence. Only 4% of 10 major banks were having transactional sites and the remaining sites were at informational level. The psychological and behavioural issues considered such as trust, security of internet transactions, reluctance to change and preference of human interface which obstruct the growth of internet banking.

Ongkasuwan and Tantichattanon (2002) the study indicates that internet banking helps banks in cost saving, increase customer base, enable mass customization for e- business services, extend marketing and communication channel, search for new innovation services, and explore and development of non-core business. The several factors considered such as user friendly interface, level of Internet experience, types of services provided, (for e-mail, file transfer, news, online financial services, shopping and multimedia services), attitude and perception, access and delivery time and experience with the Internet.

K V Kamth (Jul-Sept 2003) the prospect for the Indian banking system today is the Indian consumer. The demographic move in terms of income levels, cultural shifts in terms of lifestyle aspirations are changing the profile of the Indian consumer and acting as key driver of economic growth. The Indian banking sector is at stimulating point in its evolution where the opportunities are immense- to enter new markets, to widen new ways of working, to increase efficiency and to bring higher levels of customer service.

Mukherjee and Nath (2003) concentrated on the concept of trust in online relationship marketing in India and tested a model of trust in which "shared value", "communication" and "opportunistic behavoiur" were taken as antecedents of trust. It was concluded that both shared value and communication played a vital role on trust and that trust had significant positive influence on commitment.

(A, 2004) Described the various channels of e-banking services such as ATM, Telephone banking (Tele-banking), Mobile banking, Internet banking and its features. The concentration is given on e-banking challenges, opportunities and security aspects while carry out the banking transactions on the internet. The comparison of public, private, foreign and co- operative banks and barriers to the growth of e-banking in India are also discussed. Finally the paper discusses an overview of the major private

sector banks such as ICICI, HDFC, IDBI, UTI & GTB banks which provides e-banking services. Findings show that Private and Foreign banks have been fast in adapting to the Internet technology. Only few public sector banks offer Internet banking services whereas none of the co-operative banks offer Internet banking services. ATM is most preferred delivery channel from the common banking services. In order to enhance the reach to the rural population in the remote areas, the banks will need to automate the delivery channels in the local language which could eventually lead to shrinking of the number of branches. The banking industry's security is at a higher risk, due to the advent of e-banking.

Indian World Stats, (August 2005) Millions of web users in its cities, the internet penetration rate for India remains well below 5%. Despite India's technology outsourcing power, the country's internet penetration rate is low. Juxt Consult, a research firm based in New Delhi, surveyed urban internet users in April 2005 by talking to 30,000 Indian web users about their lifestyle and their web use. There are about 17.5 million urban dwellers in India who use the internet consistently with an additional 5.2 million who use it occasionally. Among the urban users surveyed by JuxtConsult, about one half are involved in business income way, and students make up 20% of the total. Three out of four users have a car and 50% have a credit card.

Lohse, G.L (2007) and spiller P (1999) According to the study, 2007 being declared as the broadband year in India various initiatives were undertaken by Indian government to increase internet penetration. Currently there are approx 42 million active internet users and over 47 million broad band internet connections in India. Nearly 77% of all internet users belong to the age by 18 to 35 with majority being in socio economic classes A, B, C. The average internet usage has been 25 days a month with each visit average 28 minutes. Of the internet users in India approximating 8-10 million 25% shopped online during the year 2006-07, an increase of 76% over the previous year. During 2007-08 major metropolitan cites namely Mumbai (24%), Delhi (20%) Chennai (9%) and Bengal run (6%) contributed to the bulk of online commerce of shoppers were made.

Rajesh Kumar Srivastava (2007) studied consumer's perception on usage of internet banking. The study focused on the factors that drive consumers to use internet banking and how to improve the usage rate were also another area of focus. The research found that skills of consumers can be improved so that consumers are more willing to use internet banking. In addition, the study shows that inhibitory factors like trust, gender, education, culture, religion, security and price can have only minimal effect on the consumer mindset towards internet banking.

Geetika et al (2008) discussed the concept of Internet Banking, perception of Internet bank customers, non-customers and issues of major concern in Internet banking. The state of Internet banking in India

has been explored using various concepts like e-banking scale, and gap analysis related to the various services and the security features offered. A survey was conducted in order to have a clear and focused insight about the perceptions of users and non-users about internet banking. The findings of the survey provide valuable insights into concern for security, reasons for lower penetration, and likeliness of adoption, which have been used to make useful recommendations.

Uppal R. K. (2009) the study found that in the post-LPG (Liberalization, Privatization and Globalization) era and Information Technology (IT) era, transformation in Indian banks is taking place with different parameters and the contours of banking services are dynamically altering the face of banking, as banks are stepping towards e-banking from traditional banking. On the basis of five-point likert-type scale, this paper empirically analyzes the quality of e-banking services in the changing environment. The different statistical tools such as weighted average method and ranking, the paper concludes that most of the customers of e- banks are satisfied with the different e-channels and their services, but the lack of awareness is a major obstacle in the spread of e-banking services. The paper also suggests some measures to make e-banking services more effective in the future.

Prema C (2011) the quick adoption of internet banking can lead to success for the banks, consumers as well as for the economy. The evidence for consumer's reluctance to use internet banking for scholarly inquiry about the underlying factors influencing individual consumer's decision to adopt internet banking. People are cautious and often reluctant to move from traditional ways of banking to internet banking. On the other hand, globalization and its impact on the use of information technology in the banking industry compel banks to "push" clients towards internet banking.

Irani Mahafreed (2012) According to the research, internet users in India spend an average 58 hours a week –more than half their waking hours-online a new survey has revealed. Half the netizens interviewed by antivirus company Norton admitted that they suffered from withdrawal within the first three hours of being cut off from the web. "Indian spends 12.9 hours browsing, 9.7 hours socializing and 6.1 hours on email every week," said David Hall of Norton didn't make comparisons, a survey by market research firm comScore put Canadians at 45.3 hours a week online, Americans at 38.6 hours and British at 35.4 hours.

Raza Syed Ali, Hanif Nida (June 2012) this study investigates the determinants which attract the customers to adopt internet banking in Pakistan by employing internal and external customers, on the sample size 210 for internal and 151 for external respondents through using the survey research instrument questionnaire. The confirmatory factor analysis with multiple regression technique has been

applied. The result of regression analysis shows that perceived usefulness (PU), information of internet banking (INF), perceived risk (PR), security and privacy (SP) shows that more influence to increase the intention of external customers to adopt internet banking services while government support (GS) provide more influence for internal customers to adopt internal customers in adoption of internet banking services. This study proves that external customers can be more emphasize, if they believe convenient in adopting the services. It is recommended that, bank should take some consideration to apply internet banking by delivering the information in an easier way, provide more usefulness and benefits and also minimize the fraud as providing more security and privacy. This will help the bank to increase their profit by reducing its costs, time saving and retain more potential users.

3. RESEARCH METHODOLOGY

The study is descriptive because the area of research that has been chosen by the researcher explains the attributes, which are associated with non user's views towards net banking in banks in NCR. The purpose of this study is to test empirically the factors that influence the adoption of Internet banking by consumers in NCR.

Sample size: 120

Area: NCR

Sampling Instrument: This questionnaire was formulated for collecting the data regarding the two important factors affecting towards the non adoption of net banking among consumers of banks. The purpose is to know reasons and two issues of non-users towards net banking. The questionnaire contains multiple choice questions and some statements to which the respondents filled their response on a five point scale ranging from 1(strongly agree) to 5 (strongly disagree).

Research Framework for Non Users
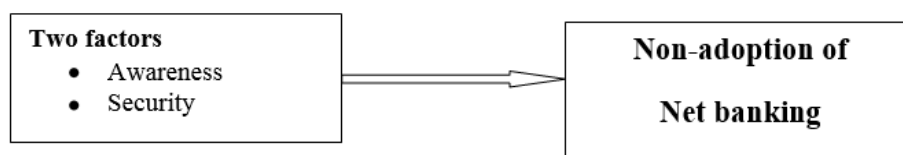
4. FINDINGS OF THE STUDY

There are some of the important reasons considered in the study that indicates that is why people are not using net banking. According to the Z score and P values calculated in table 1 shows that 98% of non users agree that non availability of internet connection is important reason then, 96 % of non users are neural as they have lengthy procedure or time to open net banking account, 93% are neutral towards the reason not aware of net banking benefits, 92% found no utility in net banking service, 90% of non users are neutral that not available with their bank, 83% agree towards under age, 79% non users agree that risk with net banking, 57% non users agree that security is major reason for not using net banking.

Table 1 Reasons for non adoption among non users with P values

S. No.	Reasons for non usage	Mean	Z Score	P values
1	Not aware of net banking benefits	3.17	1.55	0.9349
2	Non-availability of internet	3.08	1.97	0.9756
3	Security is main reason	2.13	0.2	0.5793
4	Lengthy Processing time to open	2.93	1.74	0.9591
5	Found no utility	2.46	1.38	0.9162
6	Not Available bank	3.15	1.31	0.9049
7	Under age	2.72	0.97	0.834
8	Risk with I-banking	2.57	0.79	0.7852

4.1 Awareness of internet banking

In the survey an attempt has been made to gain insight regarding the awareness of net banking linked to non usage among non-users. It is evident from the results that the lack of internet confidence how to use net banking has the top value (Mean=3.88, Std. Deviation = 1.91) and then unawareness of its benefits (Mean=3.42, Standard deviation=1.88), followed by lack of basic know how (Mean=3.35, Standard Deviation= 1.98) and lack of internet access (Mean=3.04, Standard deviation=1.94), and the last non user's agree that the lack of information provided from banks regarding the benefits (Mean= 2.52, Standard deviation=1.99).

Table 2 Awareness is related to non user's responses

S.No.	Factor 1 Awareness about net banking	Mean	Variance	Std Deviation
X101	Unawareness of its benefits	3.42	3.52	1.88
X102	Lack of basic know how	3.35	3.94	1.98
X103	Lack of internet access	3.04	3.78	1.94
X104	Lack of information from banks	2.52	3.95	1.99
X105	Lack of internet confidence	3.88	3.63	1.91

Results from the survey also indicated that in case of some of the variables standard deviation values are very consistent such as unawareness of its benefits (1.88), lack of internet confidence (1.91), lack of internet access (1.94), lack of basic know how to use net banking (1.98), lack of information from the banks (1.99), the respondents have high divergence of opinion regarding the awareness of internet banking.

4.2 Security issue regarding net banking

Security is the main important factor that influences non adoption towards internet banking among non-users. The question no. 12 from non user's questionnaire was related to security issue from non user's perspective. It may be evident that security is the main issue for the non users as the lack of computer knowledge (Mean=3.57, Standard. deviation=1.91), loss of personal information to others (Mean=3, Standard Deviation= 2.35), no secure transaction (Mean= 2.62, Standard deviation= 1.85), threat of being fraud while transacting online (Mean= 2.5, Standard deviation= 1.76), password leak may occur (Mean=2.47, standard deviation= 1.72). Some more variables results from the figure indicated that

standard deviation value are consistent such as password leak may occur during transaction (1.72), threat of being fraud (1.76), the respondents have high divergence regarding the security of doing transaction online such as no secure transaction while transacting online (1.85), lack of computer knowledge (1.91), loss of personal information to others (2.35).

Table 3 Security and Non users Preferences

X12	Factor 3- Security of transaction/Responses	Mean	Variance	Std Deviation
X121	**Lack of computer knowledge**	3.57	3.64	1.91
X122	**Loss of personal information to others**	3	5.53	2.35
X123	**No secure transaction**	2.62	3.42	1.85
X124	**Threat of fraud while transacting while online**	2.5	3.09	1.76
X125	**Password leak may occur**	2.47	2.96	1.72

Awareness and Security issues are considered in the study towards non adoption of net banking among non-users displaying the Z score and P values are shown in table 4.

Table 4 Awareness and security issues influencing the non adoption of net banking among non users showing Z score and P values.

S.No.	Factor1- Awareness about net banking/ responses	Mean	Z score	P value	Percent%
1	Unawareness of its benefits	3.42	1.54	0.4382	93.82
2	Lack of know how	3.35	1.37	0.4147	91.47
3	Lack of internet access	3.04	1.1	0.3643	86.43
4	Lack of information from banks	2.52	0.53	0.2019	70.19
5	Lack of internet confidence	3.88	1.97	0.4756	97.56
S.No.	**Factor 2-Security of transaction**	**Mean**	**Z score**	**P value**	**Percent%**
1	Lack of computer knowledge	3.57	1.66	0.4515	95.15
2	Loss of personal information to others	3	0.65	0.2422	74.22
3	No secure transaction	2.62	0.77	0.2794	77.94
4	Threat of fraud while transacting while online	2.5	0.74	0.2704	77.04
5	Password leak may occur	2.47	0.75	0.2734	77.34

According to the Z score and P value calculated indicated that 97.56% non users agree that lack of internet confidence among non users (Mean= 3.88, Z score= 1.97) then 94% agree that unawareness about the benefits of internet banking (Mean= 3.42, Z score= 1.54), 91% also agree that lack of basic know- how (Mean= 3.35, Z Score=1.37), 86% agree that lack of internet access (Mean= 3.04, Z score= 1.1), 70% agree that lack of information from the banks (Mean= 3.88, Z score= 0.53). Security is the third main important factor that influences non adoption towards internet banking among non-users. It may be evident that security is the main issue for the non users as the 95% are neutral that lack of computer knowledge (Mean= 3.57, Z score= 1.66), then 78% agree that no secure transaction (Mean= 2.62, Z score= 0.77), 77% threat of being fraud while transacting online (Mean= 2.5, Z score= 0.74), 77% agree that password leak may occur(Mean= 2.47, Z score= 0.75), 74% non users are neutral that loss of personal information to others (Mean= 3, Z score= 0.65).

5. RESULTS AND CONCLUSION

The inferences are made that reasons and barriers/ factor considered in the study are important for non users towards net banking. We conclude that 97.56% non users agree that lack of internet confidence among non users, 94% agree that unawareness about the benefits of internet banking, 91% also agree that lack of know- how, 86% agree that lack of internet access, 70% agree that lack of information from the banks. It may be evident that security is the main issue for the non users as the 95% are neutral that lack of computer knowledge, then 78% agree that no secure transaction, 77% threat of being fraud while transacting online, 77% agree that password leak may occur, 74% of non users are neutral that loss of personal information to others.

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Identify and Prioritization of Factors Affecting The Energy Consumption in CNG Stations by using Data Envelopment Analysis

Mohsen Moradian, Naser Hamidi

Department of Management and Accounting,
Qazvin Islamic Azad Universit, Qazvin, Iran.

A B S T R A C T

With regard to the issue of the use of CNG fuel has been carried out to reduce fuel costs, lower pollution and saving natural resources soreduce costs of stations and increase profits per cubic meter of gas is one of the most important factors affecting investment in the industry to attract applicants. Also, given the widespread CNG industry, Installation of energy efficient strategies can be effective in reducing product cost. In this study, using Shannon entropy to weight of criteria "Brand Equipment", "energy efficiency" and "energy consumption" was calculated. Using TOPSIS technique to prioritize key indicators affecting the energy consumption in stations then to ensure the identification of the parameters the analytic hierarchy process (AHP) and expert opinion was used. Finally, the indicators were prioritized by using DEA. Results indicate that there is nineteen main indicators are effective in reducing energy consumption of stations that The indicators' main electric compressor "," Main fan compressor "," Electric water pump "," fan pump oil "and" water heater "has been the most effective also efficient and inefficient use of equipment (as one of the criteria affecting the energy station) were identified in various capacities of station.

Keywords: StationsCNG Energy Consumption Capacity of Stations Brand Equipment TOPSIS Shannon Entropy AHP DEA.

INTRODUCTION

Energy efficiency in machinery and equipment used in CNG stations since it is important . That reduce costs of stations and increase profits per cubic meter of gas is one of the most important factors affecting investment is to attract applicants in the CNG industry.Equipment used in stations istypically included (Dispenser, GasTank, Gas Compressors, Electrical and Mechanical components) andone way to reduce energy consumption in CNG stations is reduce power such as electro coolers, blowers, main electric compressor, dryer heater that have very important role in their Energy consumption status. (Dehghan, 2011) With attention to law enforcement targeted subsidies and rising energy prices, Private sector investors is not certain to invest in this industry and need information from parameters affecting the energy consumption of CNG stations Therefore, this study using the Shannon model, TOPSIS, AHP and DEA seeks to identify indicators affect the energy consumption of CNG stations by using criteria related to energy consumptionAnd the answer to the question of how to measure these indicators such

as manufacturing quality (brand equipment) and energy efficiency affects energy consumption And the results of its helps private sector energy consumption to select the optimal equipment. Since the government policy is closing of energy prices to real price in coming years, and these policies directly affect the private sector industry and so far there is not any scientific research in relation to the impact of the reduction in energy consumption as CNG stations so existence of such vacuum makes researcher to identify parameters affecting energy consumption CNG stations with little help to stimulate and attract private sector investment in this industry.

REVIEW OF THE LITERATURE

ETABI, 2008: A paper titled "Analysis cost - benefit the construction and operation of CNG fueling station for private single purpose in Tehran" has stated, substantial economic savings resulting from the reduction in gasoline consumption gasoline vehicles and the reduction of pollution from fuel combustion in vehicles compared to gasoline and diesel-fueled vehicles, the vehicles and the construction of important gas CNG fuel stations in a situation in which one of the ways to control excessive consumption of gasoline and diesel fuels.

GHANDI, 2011: an article entitled "Evaluation of measures to reduce the power consumption of CNG staions" has stated, the compression process of natural gas in CNG stations to increase the distance traveled by the vehicle and reduce the space needed to store while these compression is requires large power consumption. This is an attempt in this article to studies power consumption with low power equipment and role of power saving status is displayed by the optimal use of the equipment and the methods to reduce power consumption methods, optimal method shall be selected.

MAHOOTCHI, 2008: A paper titled "Economic Analysis of the establishment and operation of CNG fueling station in Tehran for the private sector" has stated, the present study was to evaluate the economic justification of the project. Based on previous studies, the current level of investment required to build a fueling station CNG 14,209,000,000 Rials that the 3.43 billion are awarded to the private sector by government of the device (instead of calamity loans). Monthly income will be 61,320,000 Rials for a fuel station with 4 dispenser and 8 nozzles, where the average every 6 minutes, fueling a vehicle with a capacity of 15 cubic meters.

FARAMARZ, 2011: an article entitled "Evaluation of strategy and solution for the maintenance and operation of CNG stations" has stated, This paper attempts to provide specific strategies and experiences gained during several years due to a CNG system about the services, maintenance and operation CNG industry of safety management in education system, SCADA, efficient the deliver in the stations.

PORPARTOY, 2009: an article entitled "Evaluation of the role of finance construction of CNG" has expressed that due to the widespread production of automobiles in recent years andThe rate of growth in gasoline consumption and a continuation of this trend create a gap in the balance between production and consumption of gasoline in the country .Purpose of the present study was to assess the overall economic and financial indicators in CNG station.

RAZAVI RAD, 2009: A paper entitled "Analysis of operating costs and decrease its CNG stations" has stated. At present, most of CNG stations in the country's form of government and by municipalities and contractors with contracts with the private sector, which is approved by the National Broadcasting Company petroleum products, are governed. The aim of the present study was to cost utilization and identify indicators to measure it.

FARZANEH, 2011: an article entitled "Study of the effect of storage at the filling station CNG" has stated in filling compressed natural gas to the storage system and method of operation of the station efficient use. In the present study, based on the first and second laws of thermodynamics, and the assumptions and theoretical analysis has been used to study the effects of the filling gas you have in station are discussed.

Frick, 2007 an article titled "Optimizing the distribution of compressed natural gas (CNG) fueling stations: Case Studies in Switzerland" has stated, to become a mass market product compressed natural gas (CNG) be a dense network of stations established objective of this paper is to analyze the cost and benefit of station

METHODOLOGY

CNG stations equipments are influence energy of stations due to in most of them rotary electro engines are used. And with respect to efficiency and significant energy waste in their structure, and also relatively expensive price they have significant influence in persuading private investors in selecting the equipment in accordance with their terms of active suppliers are responsible for the CNG industry. Obviously, power consumption of manpower and civil factors such as power consumption of office buildings located in the stations are compared to the energy consumption o of the equipment used is negligible.

The research method is application, descriptive and survey. In order to identify the input and output variables and indicators for energy consumption in CNG stations interviews through expertise and experts and managers were conducted. Rating importance of criteria is based on Shannon's entropy

weighting method specified then to ensure the correct identification of the criteria used hierarchical TOPSIS and AHP model and the results were compared and confirmed indicator to be rank and given the breadth of devices and parameters, output of data envelopment analysis approach to reduce and optimize energy-efficient devices will detect.

Population and statistical sample
Technical and operational experts Deputy Oil Products Distribution Company in Tehran that have technical and administrative experience acceptable to the industry and holds a bachelor's degree is high, has been used

The data gathering method
Library Studies : To collect data related to the research and theoretical literature related to the topic of library studies and articles such as English and Persian books, theses, technical documentation submitted by suppliers, documentation Iranian Oil Products Distribution Company Website Internet-related research has been used.

Interview : In this study of the views and experiences of managers, technical experts and senior professionals active in the industry CNG, irregular interviews or open with them have been conducted.

Questionnaire : In this study, two types of questionnaires were used as follows:
Number 1 (questionnaire of Shannon entropy); In order to determine the various parameters, survey forms including all indices were provided and used experts from 25 of the Oil Products Distribution Company of Tehran who have domain required and sufficient expertise.
Number 2 (questionnaire of Paired comparisons) : Which contains a table consisting of 5 rows and 5 columns with 25 experts were used 25 of the Oil Products Distribution Company of Tehran. The five-choice questionnaire is (from very low importance to very importance). Analysis of questionnaire determines measures the intensity of adjustment towards the subject of research.

Reliability and validity of interview: In order to validate is interview with experts in their field of research regard to executive and technical experience and without limiting the time of the interview. In order to enhance the reliability use preliminary interviews and using multiple interviewers are used.

Reliability and validity of questionnaire: In the present study to determine questionnaire reliability investigated the domain experts and validity of the questionnaire survey   was   approved Cronbach's alpha was used to assess reliability of the questionnaire. For alpha coefficient, calculate the variance of

the scores for each question (or a subset of questions) and calculate the variance of all questionnaires' scores.

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{i=1}^{k} S_i^2}{S^2}\right) \quad \text{(1-1)}$$

α: Cronbach's alpha coefficient

K: Number of questions in the questionnaire

S2: Total variance

S2i: Variance related to the question (i)

In order to measure the reliability of the questionnaire using SPSS software, 0/923 was obtained using a questionnaire which shows the reliability of reliability is required.

Data Analysis : Identify factors and options affecting energy consumption in CNG stations

After interviews with experts (technicians and administrators) and to study the factors affecting energy consumption sources, energy consumption measures and options that affect the CNG stations were extracted as follows: Indicators influencing energy consumption in CNG station as follows: "Station location", "Rotation speed Electromotor", "Energy efficiency", "Quality Parts (Brand Type)", "Depreciation of equipment".Options affecting energy consumption in CNG station as follows: "Main fan compressor","Oil Heater","Air Dryer","Air compressor","Emergency lighting","Main lighting","Solenoid valve","Electro main engine compressor","Electric water pump","Blower motor","Fan oil pump","Fan canopy","Board of Dispenser","SCADA","Water Heater","Dryer Heater","PLC","G & F Equipment","UPS".

Defined parameters affecting energy consumption in CNG station:

Efficiency Equipment : Use equipment with high efficiency compared to the low efficiency has a significant impact in energy consumption. Manufacturers provide usually engines with standard design and a lower cost. This type of engine due to competition has less efficiency.

Quality Parts (Brand Type) : Responsibility for Supply all parts for a station by supplier of on the National Broadcasting Company of petroleum products Since each suppliers cooperating with the different manufacturers so Quality parts was different at the production stage and the setup stage, So that the energy consumption of the equipment installed by a supplier to a location specified capacity compared to similar equipment installed by other suppliers are making a difference. In other words, what is the quality of parts and equipment for more efficient energy consumption is reduced proportionally.

Rotation speed Electromotor : An electric motor converts mechanical energy to electrical energy. Three phase induction motors widely used in CNG industry. Obviously much more electric rotation speed will consume more energy.

Depreciation of equipment : CNG station equipment Depreciate over time due to the amount of activity and will consume more energy than new equipment.

Station location : Station location is also effect on energy consumption. For example, stations due to the geographical called the South; throughout the day has light and need less lighting against the northern stations. Also according to the geographic location of the station, two types of comperessors is used: air cooling and water cooling. Water cooled compressors will consume more energy than air cooling compressors.

Also station that had been downtown rather than station around the city are more active and thus continuously operating equipment and energy consumption is higher.

Evaluation of Weights Indicators affecting the energy consumption CNG stations using Shannon's entropy technique

In order to determine the various parameters survey forms were made including all above indicators and was used 25 of the Experts from National Broadcasting Company in the Tehran area petroleum products. The experts were asked to form their own opinion, and depending on the level of importance of each of these parameters allocate as are very important points (9), important (7), the intermediate (5), minor (3), or very low importance (1). A decision matrix is a multiple attribute decision model contains information that entropy can be used as an evaluation criterion. A decision matrix, consider the following:

T-1 :The scores assigned to the parameters by decision-makers					
Number of decision maker	**Depreciation of equipment**	**Station location**	**Efficiency of Equipment**	**Motor rotation speed**	**Quality Parts**
1	1	1	9	1	7
2	1	1	9	1	8
3	1	3	9	1	7
4	1	1	9	1	8
24	5	1	8	8	9
25	1	2	6	7	7
Total	**81**	**61**	**197**	**79**	**190**

The information content of the matrix firstly ($P_{i,j}$) is the following

$$p_{ij} = \frac{r_{ij}}{\sum_{i=1}^{m} r_{ij}}; \ \forall i,j \quad (1\text{-}2)$$

And for Ej the set Pi, j for each characteristic will:

$$E_j = -K \sum_{i=1}^{m} [p_{ij}. \text{Ln } p_{ij}]; \forall j \quad (1\text{-}3)$$

So that k is a positive constant and equal to : $\dfrac{1}{\text{Ln } (m)}$ (1-4)

Uncertainty or deviation degree (dj) of information created for j index is:

$$d_j = (1 - E_j); \forall j° \quad (1\text{-}5)$$

Finally, the weights of the index will:

$$w_j = \frac{d_j}{\sum_{i=1}^{n} d_j}; \forall j \quad (1\text{-}6)$$

The following table shows the scores assigned to the parameters by decision-makers

Step One: normalized using a simple method

T-2 :Normalized matrix using simple method				
Depreciation	Station location	Efficiency of Equipment	Motor rotation speed	Quality Parts
0.012	0.016	0.046	0.013	0.037
0.012	0.016	0.046	0.013	0.042
0.012	0.049	0.046	0.013	0.037
0.062	0.016	0.041	0.101	0.047
0.012	0.033	0.03	0.089	0.037

The second step determines the entropy of each indicator (Ej): Ej values were calculated using equation 1-3, the values shown in Table 3.

The third step is to determine the degree of uncertainty or deviation of each index: (Dj) dj values were calculated using equation 1-5, the values shown in Table 3

The fourth step is to determine the weight of each indicator: (Wj) Wj values were calculated using equation 1-6, which can be seen in Table 3. The final priority is shown in Table 4.

T -3: Criteria weights based on Shannon entropy calculations

Station location	Depreciation of equipment	Rotation speed	Quality Parts	Efficiency Equipment	
0.31	0.31	0.31	0.31	0.31	K
1.07	1.07	1.1	1.11	1.17	Ej
-0.07	-0.07	-0.1	-0.12	-0.17	Dj
0.13	0.134	0.18	0.22	0.32	Wj
5	4	3	2	1	Rj

Evaluation indicators using Analytic Hierarchy Process (AHP)

The first step: building the hierarchy. First step in AHP is drawing a graphical representation of the

problem in which the objective criteria for achieving the desired objectives and options will be shown.

The second step: judge preference (paired comparisons) and weighting:

T-4 : Paired comparisons of indicators

Station location	Depreciation of equipment	Rotation speed Electromotor	Quality Parts	Efficiency Equipment	
7	7	6	1	1	**Efficiency Equipment**
5	4	6	1	1	**Quality Parts**
3	2	1	0.17	0.17	**Rotation speed Electromotor**
2	1	0.5	0.25	0.14	**Depreciation of equipment**
1	0.5	0.33	0.2	0.14	**Station location**
18	14.5	13.83	2.62	2.45	**Total**

Then the normalized comparison matrix set up and the weighted averages of each indicator are:

T-5 Normalized matrix and the weighted average for each indicators

Average weight of each indicators	Station location	Depreciation of equipment	Rotation speed Electromotor	Quality Parts	Efficiency Equipment	
0.42	0.39	0.48	0.43	0.39	0.41	**Efficiency Equipment**
0.35	0.28	0.27	0.43	0.38	0.41	**Quality Parts**
0.11	0.17	0.14	0.07	0.06	0.06	**Rotation speed Electromotor**
0.07	0.11	0.07	0.04	0.09	0.06	**Depreciation of equipment**
0.05	0.05	0.03	0.02	0.08	0.06	**Station location**

Ranking effective options to reduce energy consumption based on weight Station indicators by TOPSIS method

Step Zero: obtaining Decision Matrix : In this study, decision matrix has 19 options and 5 indicators that indicators "Efficiency of Equipment" and "quality parts" as profit indicators and three indicators "electro-motor rotation speed", "equipment depreciation" and "location, Station," the were introduced as a cost index.

T-6 : Obtaining Decision Matrix

		0.32	0.22	-0.19	-0.14	-0.13
The initial matrix of indicators and Options of TOPSIS		Profit	profit	cost	cost	cost
		Efficiency Equipment	Quality Parts	Rotation speed Electromotor	Depreciation of equipment	Station location
1	Electro main engine compressor	8	9	6	9	9
2	Main fan compressor	9	9	6	9	8
3	Electric water pump	8	8	6	9	9
18	Boardof Dispenser	9	6	7	1	7
19	UPS	7	6	6	8	8

Step one: normalized decision matrix

Each of the measurement values are divided of same indicators:

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}} \qquad (1\text{-}10)$$

T-7 : normalized decision matrix

Square root of sum the Efficiency Equipment	Square root of sum the Quality Parts	Square root of sum the Rotation speed Electromotor	Square root of sum the Depreciation of equipment	Square root of sum the Station location	Divide each cell by Square root of sum the Efficiency Equipment	Divide each cell by Square root of sum the Quality Parts	Divide each cell by Square root of sum the Rotation speed Electromotor	Divide each cell by Square root of sum the Depreciation of equipment	Divide each cell by Square root of sum the Station location
64	81	36	81	81	0.22582	0.25517	0.21807	0.30779	0.30084
81	81	36	81	64	0.25405	0.25517	0.21807	0.30779	0.26741
81	36	49	1	49	0.25405	0.17011	0.25442	0.0342	0.23398
49	36	36	64	64	0.1976	0.17011	0.21807	0.27359	0.26741
1255	1244	757	855	895	The sum of each column				
35.4259	35.27038	27.51363	29.2404	29.9166	Sum of squares of each column				

Second step: weighting the normalized matrix The decision matrix is a parametric and must be numeric, in order to decision maker is given weight of each indicators. Set of weights (w) is the normalized matrix (R) is multiplied.

T-8 :Second step: weighting the normalized matrix

Multiplied by the weight Divided by the square root of the sum of each cell of Efficiency Equipment	Multiplied by the weight Divided by the square root of the sum of each cell of Quality Parts	Multiplied by the weight Divided by the square root of the sum of each cell of Rotation speed Electromotor	Multiplied by the weight Divided by the square root of the sum of each cell of Depreciation of equipment	Multiplied by the weight Divided by the square root of the sum of each cell of Station location
0.07226	0.05614	-0.0414	-0.0431	-0.0391
0.0813	0.05614	-0.0414	-0.0431	-0.0348
0.0813	0.03743	-0.0483	-0.0048	-0.0304
0.06323	0.03743	-0.0414	-0.0383	-0.0348

Step Three: Determine the ideal solution and negative ideal solution Virtual two options to consider as the worst and best solutions.

T-9 : Step Three: Determine the ideal solution and negative ideal solution

	Most suitable and the most unsuitable of Efficiency Equipment	Most suitable and the most unsuitable of Quality Parts	Most suitable and the most unsuitable of Rotation speed Electromotor	Most suitable and the most unsuitable of Depreciation of equipment	Most suitable and the most unsuitable of Station location	
MAX	0.0813	0.05614	-0.0345	-0.0048	-0.0087	Suitable
MIN	0.0542	0.0374	-0.0622	-0.0431	-0.0391	Unsuitable

Fourth step: Gain size of distance distance between each n-dimensional alternative assess Euclidean method. Means far from i options, from positive and negative ideal alternatives.

(1-11)

$$S_{i-} = \sqrt{\sum_{j=1}^{n}(v_{ij} - v_j^{-})^2} \qquad i = 1,2,3,\cdots,m$$

(1-12)

$$S_{i-} = \sqrt{\sum_{j=1}^{n}(v_{ij} - v_j^{-})^2} \qquad i = 1,2,3,\cdots,m$$

T-10 : Fourth step: Gain size of distance

the most suitable Division of Efficiency Equipment	the most suitable Division of Quality Parts	the most suitable Division of Rotation speed Electromotor	the most suitable Division of Depreciation of equipment	the most suitable Division of Station location	the most unsuitable Division of Efficiency Equipment	the most unsuitable Division of Quality Parts	the most unsuitable Division of Rotation speed Electromotor	the most unsuitable Division of Depreciation of equipment	the most unsuitabe Division of Station location
-0.009	0	-0.007	-0.038	-0.03	0.018	0.019	0.021	0	-0.077
0	-0.019	-0.014	0	-0.022	0.027	0	0.014	0.038	-0.068
-0.018	-0.019	-0.007	-0.034	-0.026	0.009	0	0.021	0.005	-0.072

Step Five: Calculate the relative closeness to the ideal solution: This measure is obtained by the formula:

$$C_{i*} = \frac{S_{i-}}{S_{i*} + S_{i-}} \qquad 0 \prec C_{i*} \prec 1 \qquad \text{(1-13)}$$

Step Six: Ranking Options Finally, options are ranked according to the descending order

T-11 : Ranking Options

1	Electro main engine compressor	0.93
2	Main fan compressor	0.853
3	Electric water pump	0.7033
4	Fan oil pump	0.6911
5	Water Heater	0.673
6	Oil Heater	0.6702
7	Dryer Heater	0.668
8	Blower motor	0.6617
9	Air Dryer	0.6584
10	Air compressor	0.6521
11	Fan canopy	0.6499
12	plc	0.6139
13	Main lighting	0.5697
14	Emergency lighting	0.5633
15	Even Svlvnyd	0.5371
16	G & F Equipment	0.4835
17	SCADA	0.4589
18	Board of dispenser	0.456
19	UPS	0.4483

Data Envelopment Analysis (DEA)

Since CNG station capacity is different (Station capacity is the amount of gas in terms of cubic meters is compressed by the compressor in an hour) and it is possible for a particular capacity are multiple providers contracted to the National Iranian Oil Products Distribution, Therefore, equipment efficiency and inefficiency of each of them is important for private investors. Since the nature of some indices is genus of productivity, efficiency of finite number of homogeneous decision maker units (equipment Station) are inputs and outputs in the case of multiple so Data envelopment analysis to determine the boundary between the performances of existing competitors in the supply of equipment was used.In this study, the relative scale is used as follows:

$$S = \frac{CCR}{BCC} \qquad \text{(1-14)}$$

T-12:Average relative efficiency of each supplier's capacity 2000 (Nm3 / H)

(HY)	(TGC)	(RMG)	(TAM)	(SAFE)
0.681661	0.198257	0.198257	0.198257	0.188235

For other capacitiessimilar calculations doneIn order to avoid too much information, the results are as follows:

Capacity: 1500 (Nm3/H) 250pascal: The lowest efficiency equipment in the (DRESSER) obtained from the survey conducted by one of the main reasons for using motors larger than required in the Station to supply.

Capacity: 1200 (Nm3/H) 250 pascal: Highest effectiveness Pars Compressor equipment (PC) obtained from surveys conducted with one of the main reasons is the use of high-efficiency motors. These engines have High cost. However, 30-20% of the added initial cost will be offset by lower operating costs. Another advantage of efficient engines is with low impact on the function of voltage fluctuation and load when the engine is in the details.

Capacity: 1000 (Nm3/H) 250 pascal: The highest effectiveness of the equipment Delta (DELTA) obtained with the survey conducted one of the reasons the method used to reduce load on the engine is from this Supplier .Certainly one of the best ways to reduce the load on the engine's electrical costs.

Capacity: 750 (Nm3/H) 250 pascal : Average relative efficiency of each supplier's capacity is equal and can not be commented.

Capacity: 750 (Nm3/H) 60 pascal : Average relative efficiency of each supplier's capacity is equal and can not be commented.

Capacity: 500 (Nm3/H) 250 pascal: The highest level of efficiency in equipment Pars Compressor (PC) obtained due to the mentioned.

Capacity: 250 (Nm3/H) 60pascal: Average relative efficiency of each supplier's capacity is equal and can not be commented.

CONCLUSIONS

In this research, a case study in the Oil Products Distribution Company in Tehran, Shannon entropy method for calculating the relative importance (weighting) of the indicators were. After running the Shannon entropy, the experts prefer to choose the sub-criteria affecting energy consumption was calculated positions.

As noted above, any Station depending on the inlet pressure and capacity are classified into the following types Capacity: 2000 (Nm3/H)250pascal -Capacity: 1500 (Nm3/H)250pascal - Capacity: 1200(Nm3/H) 250 pascal - Capacity: 1000(Nm3/H) 250 pascal - Capacity: 750 (Nm3/H) 250 pascal - Capacity: 750(Nm3/H) 60pascal - Capacity:750(Nm3/H) 250 pascal - Capacity:250 (Nm3/H) 60pascal and Capacity: 2000 (Nm3/H)250 pascal .

The survey was conducted on 176 sets of CNG Station with a capacity of 2000 (Nm3 / H) and inlet pressure of 250 kPa, 70 Station facilities (40 percent) use equipment Tamkargaz (TGC), equipment for 48 Station (27%)use Havayar Equipment (HY) and equipment 58 Station (33 percent) as well as equipment from other suppliers (RMG, TAM and SAFE)

The highest levels of efficiency in equipment Havayar (HY) obtained with studies done using one of the reasons UNLOADING (to prevent freewheeling engine) engine used by the supplier is such that the most effective direct consumption of electric motors could be turned off, thus eliminating the no-load no-load losses achieved. It is actually a simple method for permanent monitoring and automatic control. Most of the no-load power consumption of less importance is given to the no-load current, whereas most current at full load is about. Average relative efficiency of each of the suppliers is as follows:

T -12 : Average relative efficiency of each of the suppliers(Capacity: 2000 (Nm3/H)250pascal)											
Supplier	(HY)			(TGC)			(RMG)			(TAM)		
Equipment	S	CCR	BCC	S	CCR	BCC	S	CCR	BCC	S	CCR	BCC
Electro main engine compressor	0.1	0.94	0.958	0.1	0.97	0.989	0.1	0.92	0.938	0.098	0.97	0.989
Main fan compressor	-	-	-	-	-	-	--	-	-	-	-	-
Electric water pump	0.1	0.73	0.744	0.1	0.72	0.734	0.1	0.75	0.765	0.098	0.72	0.734
Fan oil pump	-	-	-	-	-	-	--	-	-	-	-	-
Water Heater	1	1	1	0.1	0.96	0.979	0.1	0.98	0.999	0.098	0.96	0.979
Oil Heater	1	1	1	0.1	0.91	0.928	0.1	0.98	0.999	0.098	0.92	0.938
Dryer Heater	0.1	0.73	0.744	0.1	0.93	0.948	0.1	0.92	0.938	0.098	0.93	0.948
Blower motor	0.1	0.73	0.744	0.1	0.82	0.836	0.1	0.74	0.754	0.098	0.82	0.836
Air Dryer	0.1	0.9	0.918	0.1	0.72	0.734	0.1	0.78	0.795	0.098	0.72	0.734
Air compressor	-	-	-	0.1	0.85	0.867	0.1	0.85	0.867	0.098	0.85	0.867
Fan canopy	1	1	1	0.1	0.85	0.867	0.1	0.99	1.009	0.098	0.99	1.009
PLC	1	1	1	0.1	0.94	0.958	0.1	0.96	0.979	0.098	0.94	0.958
Main lighting	1	1	1	0.1	0.98	0.999	0.1	0.96	0.979	0.098	0.94	0.958
Emergency lighting	1	1	1	0.1	0.96	0.979	0.1	0.96	0.979	0.098	0.96	0.979
Solenoid valve	1	1	1	0.1	0.95	0.969	0.1	0.95	0.969	0.098	0.95	0.969
G & F Equipment	1	1	1	1	1	1	1	1	1	1	1	1
SCADA	1	1	1	0.1	0.91	0.928	0.1	0.92	0.938	0.098	0.91	0.928
Board Dispenser	1	1	1	1	1	1	1	1	1	1	1	1
UPS	1	1	1	0.1	0.98	0.999	0.1	0.9	0.918	0.098	0.9	0.918

In order to consistency indicators together and objective investigation of hierarchical AHP was used to prioritize the major indices extracted (options) of the TOPSIS method was used for the purposes of this study, and due to the Genus nature and boundaries of performance indicators and options positions of options in different capacities were determined using the technique DEA.

According to research findings, it can be concluded that the Main factors affecting energy consumption respectively CNG Jayga state indicators "Efficiency of Equipment", "quality parts", "rotation speed electric", "equipment depreciation" and "location Station" were ranked first to fifth. Also according to the specific weight of each sub-criterion, sub-criteria are most important to the "main engine compressor electro", "Main fan compressor", "electric water pump", "fan pump oil" and "water heater" was and other sub-criteria are next in priority.

Recommendation for future researches

Reasons for the increase or decrease of energy consumption data mining are classified. Future researchers can be identify parameters influencing energy efficiency one and dual fuel stations. TOPSIS technique can be effective against ANP technique that takes into account the interrelationships of variables and indicators noted measure. Rankings following parameters (options) techniques using AHP and fuzzy TOPSIS is conducted Factors influencing the increase or decrease energy consumption model using AMOS or LISREL software are reviewed. can be used with other techniques such as indicators weight and gained FAHP.

Limitations of the study

With regard to energy consumption and reduce or increase the impact of such climate, humidity and dryness of the air and other environmental factors.

Those are uncontrollable and unpredictable, so check the exact rate of consumption is not available.

Since quality can have a major effect on the energy dissipation is

- To evaluate the energy efficiency equipment suppliers in the country, the quality of input power for all equipment in the ideal case was assumed.
- When assessing the amount of savings, the use of a minimum guaranteed Efficiency of is more reliable because all motors must be equal to or greater than the size of the computation, thus landlord is located.

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Comparative Analysis of Ultra MOSFET with Conventional MOSFET

Neeraj Gupta [1], L.M. Gupta[2]
[1]Assistant Professor, ECE, ASET
[2]Assistant Professor, ME, ASET

A B S T R A C T

UMOSFET is a power MOSFET. It is called UMOS because its gate region is in U shape, the specific on resistance of the UMOS is significantly smaller than its predecessor DMOSFET as the channel density can be increased can be made larger by using a smaller cell pitch. Unlike DMOSFET it does not have a JEFT region which further reduces the on resistance. A high voltage can be supported by the UMOS structure. The breakdown voltage of the UMOS is significantly larger than ordinary MOSFET. Larger N-drift region allows large amount of currents and also reduces the resistance as the area is increased significantly. The bulk which was a sizable portion of n-channel and p-channel MOSFET is quit thin is UMOS, whereas the drain which makes a small portion in MOSFET occupies a significantly large area and play a major role in the reduction of on resistance and withstanding the high value of voltages.

Using UMOS is saving 40% free space than using NMOS technology. The electric field in the gate oxide is relatively large in the U-MOSFET structure. In addition, the reverse transfer capacitance for the power U-MOSFET structure is much greater than the NMOS.

We are aiming to model a UMOS structure using silvaco and compare its characteristics with an NMOS modeled in silvaco.

Keywords: MOSFET, VMOSFET, Trench, Silvaco, DMOSFET

INTRODUCTION

The UMOS field effect transistor or UMOSFET is a form of vertical or "trench" style structure used for MOS transistors. This form of semiconductor "trench" or vertical semiconductor technology offers significant advantages in terms of speed and lowering the ON resistance. As a result many manufacturers of semiconductor electronics components offer vertical forms of structure for their MOS transistors.

The UMOS transistor is very similar to the VMOS FET. It is a slightly later development of the same basic principle. UMOSFETs are able to provide a useful function in many relatively high power applications, both in power supplies and as RF power transistors. It can be seen from the diagram of the structure of the UMOS FET, that it is very similar to that of the VMOS FET. The main difference is that the bottom of the V is flattened out to give it a U shape - hence the name UMOS. As with the VMOS FET,

where the structure is very similar, the most striking point about the new device is the "U" groove in the structure which is the key to the operation of the device. The "U" groove performs the same function as the "V" groove found in VMOS FETs.

It can be seen that the source is at the top of the device, and the drain is at the bottom. Instead of flowing horizontally as in the standard FET, current in this device flows vertically[1-3].

UMOS Structure

UMOS have the gate trenched into the silicon in U shape as we can see from the Fig 1(a). UMOS is divided into four parts apart source, bulk or substrate, drain which is composed of two regions N- drift and N+ region. The source is a highly doped N+ region. Substrate is a p-type lightly doped region. The major part portion of drain that is N-drift region is a lightly doped region. The bottom most part is a highly doped N+ region. The doping can be done using ion implantation after which a U shaped trench is made into the semiconductor. After the trench is made oxide layer is grown and a gate is deposited in it, since the shape of the gate region is in U it is named as UMOS[6-8].

Figure 1(a) shows the basic structure of a UMOS when it is sliced vertically, it should be noted that the source1 and source2 are connected to each other when we look in a three dimensional structure however the simulation is done in 2D we will consider them to be separate for the sake of simulation and we will apply same voltage to both source1 and source2 so that they can act as a single entity, similarly the bulk is considered separated into two parts bulk1 and bulk2 for the sake of simulation, however same voltage will be applied so that the effect remains same.

(a) Structure of Simulated UMOS.   (b) UMOS with Charge densities
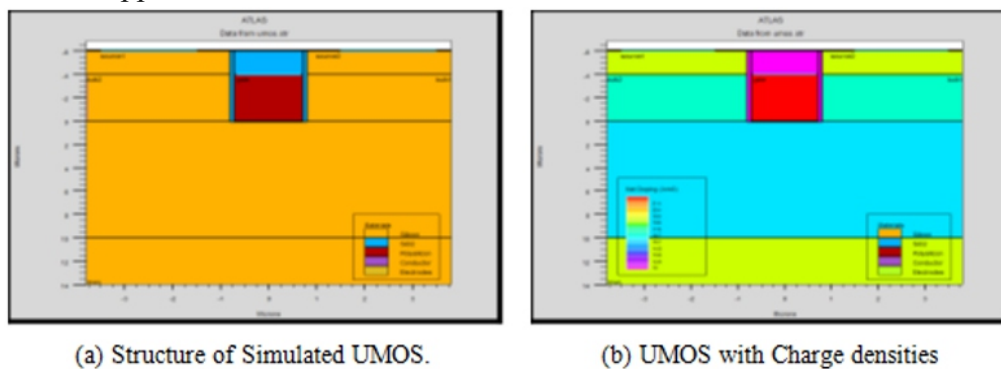
Figure 1: Structure of Simulated UMOS & Charge densities using Silvaco

Figure 1(b) shows the doping concentration and the dimensions of the UMOS. The oxide thickness is taken to be 0.1μm. Source is 2μm thick and the substrate is 4μm. The drift region thickness is 14μm of which 10μm is the N-drift region and the remaining is the N+ region.

The doping profile of the simulated UMOS is as follow. Source is an n-type highly doped region, doping concentration is 10^{-19} cm^{-3}. Substrate is a lightly doped p-type region, doping concentration is 10^{-17} cm^{-3}.
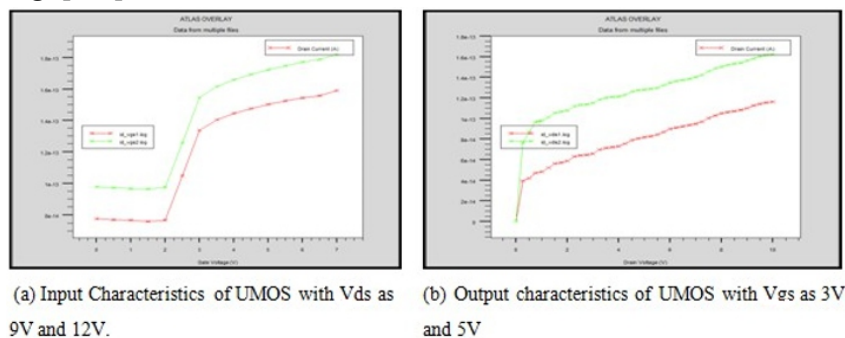
N-drift region is a lightly doped n-type region, doping concentration is 10^{-16} cm^{-3}. Then N+ region is a highly doped n-type region, its concentration is 10^{-19} cm^{-3}.

Working of UMOS

When a positive bias is applied to UMOS drain without the application of a gate bias. Junction is formed between the lightly doped p substrate region and the N-drift region, the junction formed is due to the reverse biased as the substrate is connected to ground and a voltage is applied to the drain. N-drift region supports the voltage applied across it. When a positive bias is applied to the gate of UMOS it results in the flow of the drain current, as the application of positive bias on gate produces an inversion layer at the surface of the P substrate along the sidewalls of the gate trench. The inversion layer formed acts as a conductive layer for the movement of electrons from the source terminal to the drain terminal. After moving from the source through the inversion layer, the electrons enter the N-drift region. As the applied bias is positive there will be an accumulation of charges, this accumulation layer at the bottom of the gate surface helps in the distribution of the electrons in the N-drift region. The current spreads from the bottom of the gate to the entire cross section of the N-drift region. However the non-uniform distribution of current will increase the specific on resistance of the UMOS as compared to the N-drift region.

UMOS operates in a blocking mode when the gate is shorted with the substrate, there is a junction formed between the substrate and the drain region, the thickness of the N-drift region determines the level of voltage the UMOS can support as most of the applied voltage is supported by the lightly doped N-drift region. The thickness and the doping concentration of the N drift region allows the user to fabricate device with required breakdown voltage, still a fraction of voltage is supported by the p-substrate. It should be kept in view that p substrate concentration determines the threshold voltage of the UMOS so it cannot be varied to get the desired breakdown voltage, since high threshold voltage will mean high resistance, in order to achieve low resistance the maximum doping concentartion of the substrate has to be limited.

The channel length can be reduced to an optimum value but beyond that optimum value if the thickness is reduced the depletion region will increase and will reach the source, which will result in decrement of the breakdown voltage[4-5].

(a) Input Characteristics of UMOS with Vds as 9V and 12V.

(b) Output characteristics of UMOS with Vgs as 3V and 5V

Figure 2: Input & Output Characteristics of UMOS

CONCLUSION

UMOS designed and output characteristics simulated are as expected. The device has higher break down voltage. The ON resistance is less than that of DMOS. UMOS can be used as a typical power MOSFET.

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CDROID: Used in FUJITSU Server for Mobile Cloud

Santanu Koley[1], Navjot Singh[2]

[1]Sr. Assistant Professor, ISIM (IIIM), Mansarovar, Jaipur (Rajasthan).

[2]Assistant Professor, HOD, Jasveer Memorial P. G. College, Sandwa, Churu (Rajasthan).

A B S T R A C T

In today's era, it is important to save energy as much as for the sake of better financial, environmental, national security and above all the mankind. The Smartphone batteries are huge consumer of energy when using several apps. The proposed system is to develop a CDroid operating system in Fujitsu server for mobile cloud computing as saving energy, enhancing battery life and put aside processor cycles of mobile phone, sharing data / information and faster access. Our CDroid system shares both the server and phone memory as well by using offloading mechanism. The Smartphone transmits the data in binary format by using CDroid device stored in it. CDroid device includes application framework to countenance multitudinous applications. The FSK, FDMA and TDM maneuver to locomotion information. CDMA2000 1xEV-DV promote channelized the information that may include both data and voice. The UMTS, WCDMA, HSDPA, EVDO are some protocols to communicate through mobile tower. A mobile tower is made up of microwave, GSM antennas and radio frequency (RF) cables. They intercommunicate with the base station through MTSO. Bandwidth provided for this kind of radio network around 1200 to 1400 MHz. Wireless spectrum is used the RF between 800 MHz to 2.2 GHz bands. The Smartphone uses 0.6 to 3 watts. The CDroid OS inside fujitsu server in cloud is conveyed by ISP's as per standards.

World's fastest fujitsu server contains CDroid (a server approach) constituents within cloud accommodates the connection handler (secure), optimizer users traffic, caching and pre- fetching; content compression is also done here. The security issues must encompass various apps, anti- phishing, cookie handler, sensitive information blocker, push notification handler andremote wipers. Mobile advertisement blocker, push notification handler protects users' privacy. Synchronization handler, remote code executor handles mobiles computations and loading the data backup.

As the operating system and information are accumulated onto clouds the power necessitate to process consumed into fujitsu server. This preserves Smartphone battery life, besides this mobile cloud server is quickest among others. It provides the winged response to the user. We had described thoroughly the architecture of newly proposed system. This will be next step towards the changing nature of hybrid cloud unsegregated mobile technology for the future.

Keywords: Smartphone, CDroid, Fujitsu Server, Cloud Computing.

INTRODUCTION

The Smartphones are already able to upload or download data, software, mainly Apps to and from server by offloading technique [1]. The Android OS is stored completely on the mobile phone device memory on which it runs and consumes power. Our proposed system is to use a CDroid OS in Fujitsu

server to best serve cloud computing facility. The system stores, executes in the cloud utilizes electricity at IaaS cloud location. As we know the current growth rate of battery capacity is just 5% per year (Robinson et al) [2], which is very less according to growing market needs. The Fujitsu server is fastest as because it transfers data between CPU and memory in a way which is best in the world. The energy consuming Apps are installed partly on clouds, so a lot of electricity is saved and enhances battery life.

Throughout this paper we will use several diagrams and figures to make others understand about our proposed system.

The Proposed System

The system need the cloud services (IaaS), where the Fujitsu server is being installed. Smartphones using wi-fi and 3G enabled network connectivity is best for the system. They communicate the server cloud through mobile tower. The phone also needs CDroid OS. The problems and solutions to achieve the goal using our system both will be discussed later in this paper. The basic structure for the proposed system is as follows:

Figure 1: Proposed System Architecture (Basic).

The above diagram (Figure 1) tells us about the basic idea about the smartphones connecting with fujitsu server at clouds provided at cloud systems with the help of communication system like mobile tower. There are lots of intermediate devices and protocols are there, we will discuss them later on this paper.

Cloud Computing

Mobile Cloud Computing (MCC) is the greatest factor to reduce power consumption on the mobile devices [3].

Cloud services are internet-service-oriented computing concept, where Hardware, Software and data are shared. The proper definition may be "Share and use of applications and resources of a network environment to get work done without concern about ownership and management of the resources and applications"- (M-S. E Scale, 2009) [4]. It is also a combination of preexisting technology, which gives some services. The two different models used in cloud computing are Deployment model and Service model.

The service models are of three types Software as a Service (SaaS), Platform as a Service (PaaS), and Cloud Infrastructure as a Service (IaaS).

They follow NIST (National Institute of Standards and Technology) model [5]. We will concentrate on the IaaS part for our proposed system.

The essential characteristics of cloud computing are On-demand services, Broad network access, Resource pooling, rapid elasticity, measured service, self provisioned, pay per use (lower cost), scalability, ease of utilization, quality of service, reliability, outsourcing, simplified maintenance and upgrade, low barrier to energy etc. "Mobile Cloud Computing (MCC) at its simplest refers to an infrastructure where both the data storage and the data processing happen outside of the mobile device. Mobile cloud applications move the computing power and data storage away from mobile phones and into the cloud, bringing applications and mobile computing to not just Smartphone users but a much broader range of mobile subscribers" [6][7].

As processing task is not done by the mobile device the power and memory consumption is also less in this area and eventually the mobile device became very fast.

For sake of our proposed system Cloud Infrastructure as a Service (IaaS) will be used to store the mobile phones data, Apps etc in the form of Second code segment or CDroid Server. As the system uses cloud services, it does not depend on geographical locations. To reduce cost the cloud infrastructure including fujitsu server must be placed in a country where electricity cost is lowest [8].

Problems with Android

Android systems hanged a lot, as lots of processes runs on the background. This causes another big problem i.e. drainage of battery. After removing the cover we had seen the Smartphones are heated badly, again for the same reason. Lastly, the malware applications [9] cause problems when downloading anything from google play [10] or elsewhere.

CDroid

Cdroid is an IaaS cloud-integrated mobile operating system; they can be used in Smartphones (e.g. Android). To enhance speed and increased battery life of mobile phone (Smartphone) theCDroid system is being introduced. It is a system which has two different segments. The first code segment which is named CDroid device here occupies its place within the Smartphone and second one is mentioned by CDroid server that inhabited inside the clouds (private/public) [11].

First code segment/ CDroid device

This part will handle all the operations done by the Smartphone like calling, SMS/ MMS, internet access, App management etc. and maintain all those using log files. The CDroid device sends all the collected data and information to the cloud side CDroid server as shown in the picture. This process is completely a piggybacking method.

Second code segment/ CDroid Server

This is the cloud-side of the system which handles a reliable connection with CDroid device, optimizes the user traffic cashing and pre-fetching and content compression. The security issues like uses of different apps, anti-phishing programs, cookie handlers, sensitive information blocker, remote wiper etc. It protects the user's privacy as mobile ad blocker; push notification handler is being used. They also handle mobile computation offloading and data backup synchronization handler, remote code executor [12] for better mobile user access.

Working Strategy

CDroid part inside the Smartphone is the operative load environment within it, which works with the other part installed in the clouds as IaaS. The cloud service provider itself is responsible for all synchronization, communication with the Smartphone. So a lot of work is reduced by the Smartphone and it become faster with enhanced battery life. The rest of the parts are already installed in the Smartphone to communicate with the cloud. We assume the internet connection is on when this system works. A set of userid and password is provided to every Smartphone connected with the cloud network.

CDroid tools are used in Android based mobile phones to switch off/on wi-fi, Bluetooth, data service. There are some free Apps found in google play.

Solution with Cdroid

CDroid systems First code segment is on cloud, so a number background a process executes over the

cloud server. It solves several problems like hanging of a cell phone system, saves the energy that was supposed to consume from phone battery. The heat problem of mobile hardware is also solved in this way. The cloud providers use several anti-malware applications, solves the problems when downloading anything from google play or somewhere else.

Fujitsu Server

Fujitsu server system prototype we are using in the cloud because of high geared speed and flexibility measured so far in simultaneous application.

Here system performance is measured in every pico second. The next generation server which is using Resource pool architecture (described in the figure) [13].
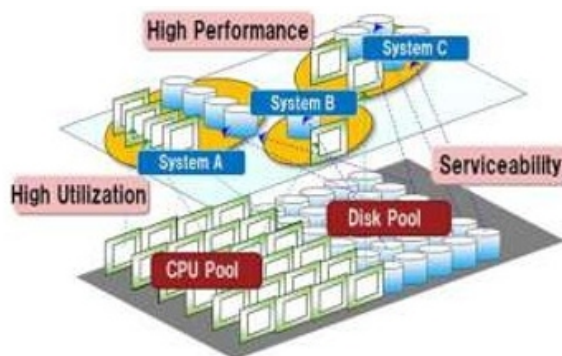
Figure 2: Resource Pool Architecture.

Pooling or arranging of μ-processors, hard disk drives (HDDs) are done for high performance, high utilization and serviceability [14][15]. Figure 2 describes how resource pool works. The above resources are for processing and storing of huge data inside a cloud performs faster and quicker. Other hardware components that comprise the ICT (Information and Communication Technology) infrastructure, and connecting these resources together using high-speed interconnects, high storage capabilities are also needed. The ICT infrastructure developed at its maximum (nearly 86% from 2001 and 2011) globally [16]. In the prototype version, the CPU/HDD interconnects ran at a speed of 6 Gbps [17] without any mutual interference.

As the data transfer rate of this server is very high, that's why it can handle variety of services. Those are the reason behind proposing fujitsu server for the cloud server. There are big numbers of servers with storage devices are interconnected to provide cloud services in data centers of a cloud provider. Developing ICT infrastructure for Batch compute server, Application on database server, Turning on applications in phases, Complex timesharing server, Workloads that change seasonally, Real-time applications, System utilization etc [18] need high I/O performance or large-scale data processing tasks that use the local disks of servers, as well as for other services requiring a level of performance that had been difficult to satisfy with configurations geared toward traditional cloud systems.

Specification

The system uses a resolution of 600X800 pixels speed of 400MHz. here storage is not specific; it depends upon the cloud service provider companies business needs, according to that the HDD pool is created and maintained. Microsoft CE operating system with remote application enabled. The networking is done between servers by using Infrared, Bluetooth and wireless LAN as it is required.

Features of the newly developed technology are as follows:

Pool Management Feature

In accordance with user requirements for CPUs, HDDs and other needs, the pool management feature allows for necessary resources to be allocated from the pool, the deployment of OS and middleware resources, and the on-demand provision of servers in a required configuration.

Middleware that offers storage function using servers apportioned from pool. Using server resources from the pool, storage capabilities are delivered by configuring the middleware, which controls HDD management and data management functions. Whether it is a server with multiple local disks tailored for large-scale data processing tasks, or RAID functions for improved data reliability, the system can be flexibly configured to meet performance and power consumption requirements.
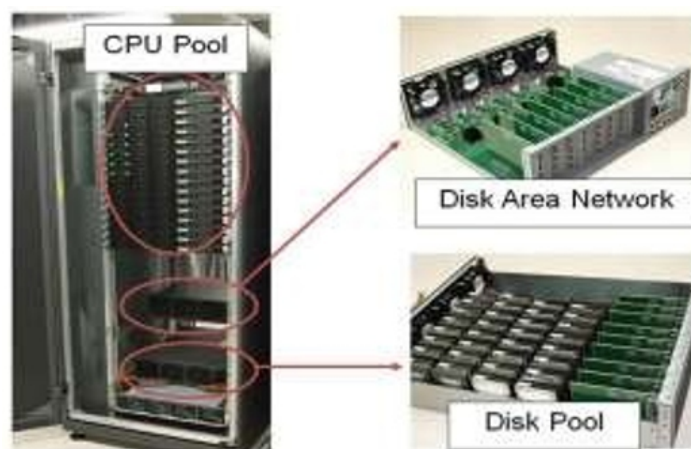
Figure 3: Actual Fujitsu Server Hardware Prototype.

High-speed interconnect technology that connects the disk pool comprised of multiple HDDs is connected to the CPU pool via a high-speed interconnect disk area network. The HDDs linked to the CPUs through the disk area network have the same disk access capabilities as the local disks in a typical server, and their performance is not affected by other CPUs. A disk area network was created using prototype interconnects.

Fujitsu cloud services which provide a fully flexible model for IT infrastructure, platforms and applications, allowing companies to match technology systems and costs directly to changing business needs [19].

Communication strategy

The Smartphone through the Sorting Client Application (SCA) sends the input file to the nearest access-point. From the access point, the packet gets routed to the service provider edge routers. After edge routers, the packet gets routed to the core routers behind the internet backbone and then to the data centers. The power consumption of switches has been excluded as this has not relevance with our topic. In most cases there will be only a few number of them and their power consumption in insignificant when considered [20].

Figure 4 depicts how CDroid device components inside Smartphone have some sort of basic Smartphone applications; the device collects information about some user activities and behavior like phone calls, sms send and receiver information, GPS co-ordinates etc. The information (may include voice too) then send to the cloud side of the proposed system as a piggyback to the user traffic.

Application Framework, Libraries, Android Runtime, Kernel is used to communicate with the Smartphone hardware.

The application framework of CDroid device includes IEEE 802.11 standard for WLAN which uses Enhanced Data GSM Environment (EDGE). We use EDGE protocol that is several times faster (around 236 Kbit/s or more) than the primeval General Packet Radio Services (GPRS) speed at about 56Kbit/s based on wireless fidelity.

The digital transmission method includes 3G cell phone network protocols like Universal Mobile Telecommunication Service (UMTS), Wideband Code-Division Multiple Access (WCDMA), High-Speed Downlink Packet Access (HSDPA) [21], and Evolution Data Maximized (EV-DO) with Data and voice (EV-DV) too. These technologies provide a maximum data transfer speeds of up to 3 Mbps. it is easy to browse full-fledged Web pages, watch streaming video, tune into live TV or on-demand video programming, make large in seconds, play 3D games, & much more. IP connectivity of this technology is packet based.

A city or village is divided into several cells; each cell is typically sized at about 10 square miles (26 square kilometers) i.e. the range of one mobile tower. Cells are normally thought of as hexagons on a big hexagonal grid. Each cell has a base station that consists of a tower and a small building containing the radio equipment. Base stations are often called masts, towers or cell-sites; they follow the concept of mesh topology.

The data transmission of a Smartphone is between 0.6 watts to 3 watts; which is lesser than Citizen Band Radios. The two non-adjacent cells can reuse the same frequency. They fulfill the two requirements, first the frequency will remain within the cell and secondly the saving of phone batteries.

All Base Station (BS) within a cluster (A group of adjacent cells) are connected to a Mobile Switching Centre (MSC) using land lines. Each MSC of a cluster is then connected to the MSC of other clusters and a Public Switched Telephone Network (PSTN) main switching centre. The MSC stores information about the subscribers located within the cluster and is responsible for directing calls to them. Each carrier in each city also runs one central office called the Mobile Telephone Switching Office (MTSO). This office handles all of the phone connections to the normal land-based phone system, and controls all of the base stations in the region. The Components of the base station include transceivers, which enable the transmission and reception of radio signals through the antennas, plus signal amplifiers, combiners, and a system controller.
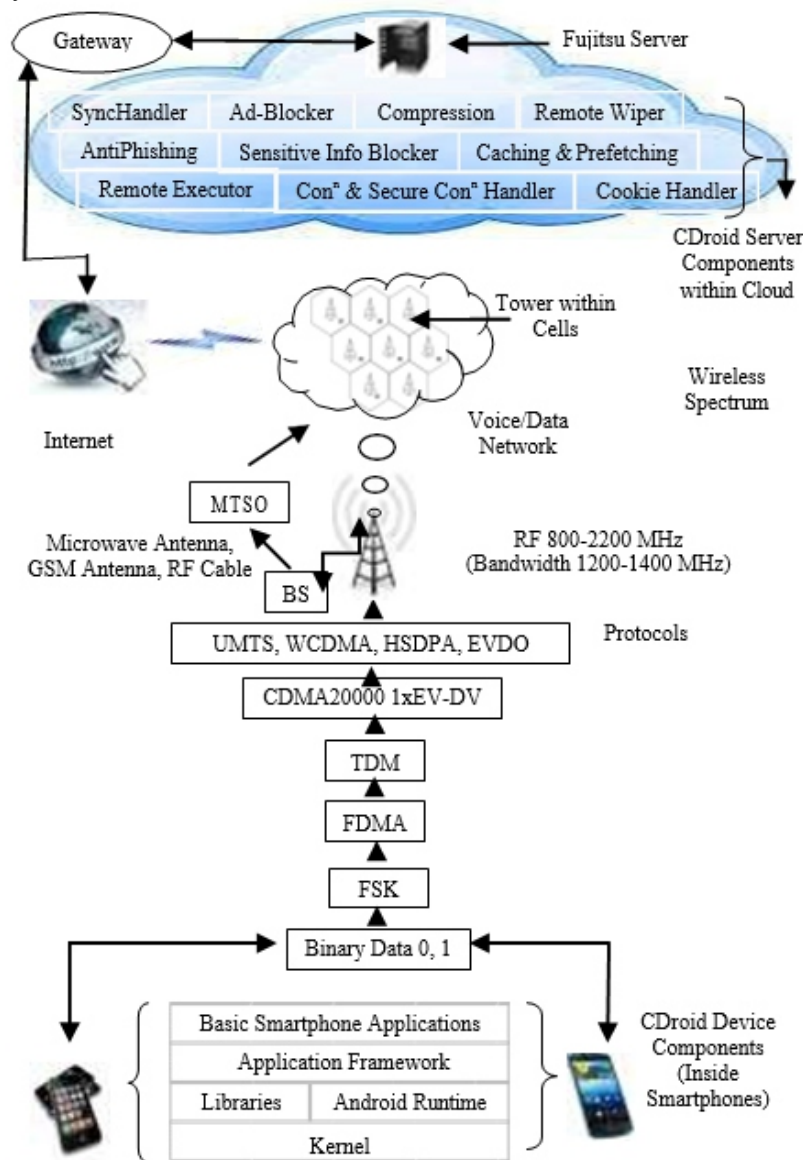
Figure 4: Advanced System Architecture.

A Smartphone deals on digital data (the voice is also converted into binary i.e. 0 and 1.)Frequency Shift Keying (FSK) uses two frequencies, one for 1s and the other for 0s, alternating rapidly between the two to send digital information between the cell tower and thephone. The CDroid device using Frequency Division Multiple Access (FDMA) puts all the binary data (including voice) on a separate frequency. The frequency of cell phones, cordless phones, and cell phone tower signals ranges between 800 and 2200 MHz. The frequency it considers is Radio Frequency. Cell phone technology combines the two great technologies named traditional telephone and old radio technology [22].

The wireless spectrum which is a limited resource used by cell phones can communicate on 1,664 channels or more. In addition, cell phones Time Division Multiple Access (TDMA) use a dual band. It assigns each call a certain portion of time on a designated frequency. This means that it can operate in between 800 MHz to 1900 MHz (or around 2.2 GHz) bands. Clearly the bandwidth, a cell phone uses is 1100-1200 MHZ.

CDroid Server Components within cloud contains connection handler (secure) that handles the connection with CDroid device to optimize users traffic caching & pre-fetching; content compression is also done here. The security issues must contain app, anti-phishing, cookie handler, sensitive information blocker, push notification handler and remote wiper. Mobile advertisement blocker, push notification handler protects users' privacy. Synchronization handler, remote code executor handles mobiles computations and loading the data backup.

Code Division Multiple Accesses (CDMA) [23] gives a unique code to each call and spread it over the available frequencies. Here we will use CDMA2000, which is of three types namely CDMA2000 1x, CDMA2000 1xEV-DO (First Evolution Data Optimized) and CDMA2000 1xEV-DV (First Evolution Data and Voice). For our case it better to use CDMA2000 1xEV-DV where the forward link it supports is 3.08 Mbps and a reverse link nearly 1 Mbps [24]. The Cloud Radio Access Network (RAN) will be use by the proposed system.

Fujitsu's Business Smartphone F-04F can provide 3 days of battery life, but using the above architecture, it can be extended up to 6 days which is quite surprising in Smartphone produced nowadays.

CONCLUSION

It also saves memory spaces as a part of different apps shares cloud server. Also the fastest service should be provided by the system. The proposed system will be beneficial for the cloud computing service providers like Amazon web services, Rackspace, CenturyLink/Savvis,Salesforce.com,

Verizon/Terremark, Joyent, Microsoft, Google, IBM, Sales force etc. It will increase their business volume and quality of service. This theoretical approach can be making a practical one if we get proper guidance and funding for welfare of humankind.

LIMITATION

The proposed system needs high speed internet connectivity, which is another cons found in Android based phones; failure of this could stop the Apps in a Smartphone. The 4G technology is also available and that can provide the better result.

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