

Lexical Analysis of Selected Icons available with Indian e-Governance Website

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Abstract— In this paper, we have evaluated e-Governance icons available with Indian e-Governance Website using lexical analysis. We have selected 12 icons in e-Governance website based on primary characteristics and secondary characteristics such as labels off, shape, synecdoche, color indicator etc. In lexical analysis, we have performed the lexical breakup of the icons and these icons are classified as icons, indices and symbols. All selected icons have indexical features in them and therefore, they may not easy to understand to users like general public.

Index Terms— Indian e-Governance Website, e-Governance, Icons, Lexical Analysis, Lexical Breakup, Index

1 INTRODUCTION

THIS study analyses the use of icons in Indian e-Governance Website. Icons are integral part of the iconic user interfaces. Such interfaces are displayed for interactive usage by diversified users, who may represent general public and may be from weaker socio-economic and educational background. Let's briefly understand the role of iconic interfaces [4] in Indian e-Governance Website as under-

- Visually communicate various functions
- Transcend the language barrier
- Reduce the time required for understanding the interface

We can obtain the information from Indian e-Governance Website such as Domicile Certificate, Driving License, Marriage Certificate, Passport, Acts of Indian Parliament, several Welfare Schemes, comprehensive information on all levels of Education, Police & Judiciary, Development & Regulation of Water Resources, Healthcare Programs & Policies, Citizen Services etc. The purpose of this research is to help the professionals involved with the web design in usage of icons and corresponding components. This research helps users to understand and classify the icons used in e-Governance website such as Indian e-Governance Website.

National Informatics Center (NIC) is the organization that is involved in the most of the e-Governance initiatives by Government of India [16]. This Indian e-Governance Website has been designed by NIC keeping the diversified population in mind. The e-Governance should reach up to the all public by using a range of modern information and communication technologies such as Local Area Network (LAN), the Internet, mobiles etc. National e-Governance Plan (NeGP) has a provision for State Wide Area Network (SWAN) to connect all the

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government offices up to the Common Service Centers (CSCs) for making public access easier in rural areas [15]. Indian e-Governance is a big challenge and a far big opportunity to bring services to all citizens. The most significant characteristic of any successful e-Government application is its quality and accessibility. The issue (appearance, cost and time) of integration of legacy systems comes onto the scene. As the information collected by governments may be politically sensitive, installation of appropriate security mechanisms may be an important technical consideration. At the same time, many other policy issues need to be resolved, such as authentication and confidentiality. The major issues related with e-Governance are such as technical issues, privacy, securities, social issues, infrastructure, accessibility, usability, acceptance, political will power, economical issues, maintainability, reusability, portability, legal issues, literacy and other [8].

Among the various issues with Indian e-Governance Website we have selected an issue of icon design and evaluation for our research. The aim of using the icons is to make those interfaces more friendly and easy to use. Appropriateness of the icon depends on its design, evaluation and testing. User participation is always vital in many processes. Icon tests are evaluated mainly using expert-based and the user-based methods.



Fig.1 Home Page of e-Governance Website of India

The expert-based methods involve experts along with/ without users whereas user-based methods have extensive user participation. For icon evaluation, both types of methods are employed and these methods are listed as Test without Context, Test with Context, Test with Comparison, Test of Free Recognition, Test of Associated Proposition, Test of Preferred Association, User Survey, Private Rating, Long Distance Visibility, Lexical Analysis and Semiotic Analysis [2, 4, 5, 6, 8]. We have studied all above methods in required depth. In this research work, we have employed an expert-based method - Lexical Analysis for evaluation and classification of the icons on Indian e-Governance Website.

Fig. 1 depicts a home page of Indian e-Governance Website. This website has used several icons for representation of various activities. We have tried to tackle some basic questions as under:

1. How are icons in Indian e-Governance Website classified?
2. Are these icons easy to understand to users of this website?

2 RELATED WORK

During the literature survey, we have come across some studies and research papers published on different aspects such as study of icons, their evaluation and Indian e-Governance. We have discussed about such related literature ahead.

The book "The Icon" has discussed about fundamental of icons such as icon style, appearance, fitting, design and evaluation methods. It has described various components of icons viz. border background, label, size, shape, synecdoche, clarity etc [5]. We have applied the appropriate component-based criteria learned for selecting suitable icons from e-Governance website for further semiotic analysis.

Shah M. has discussed about what is e-Governance and structure of e-Governance in India [8]. This study has analyzed the governance issues and challenges for the country. Withrow J. et al. has undergone a study of comparative usability evaluation for an e-Governance website. These studies have been instrumental in development of in-depth understanding about how to work with e-Governance websites [6].

Katre D. et al. has elaborated usefulness and usability evaluation of all state government websites of India. This study has provided a listing of parameters for visual design such as color scheme, layout, image size, logical arrangement of contains and consistency [3]. Such understanding of vital parameters in icons as a visual design has helped while shaping appropriate component-based criteria for selecting suitable icons in our study.

Bhutkar G. et al has used the semiotic analysis combined with

usability and ergonomic testing for evaluation of icons in medical user interface. In this paper, usability evaluation methods such as usability testing, user survey, lexical analysis, semiotic analysis and long distance visibility testing are used to evaluate icons [4]. We have used lexical breakup for generating a data required for classification of icons related with e-Governance.

There are many studies which elaborate on classifications of icons. Yannick, L. has discussed the semiotic analysis of medical imaging [7]. As per this study, there are three types of signs viz. icon, index and symbol. Poovaiah R. has stated that the symbol design is governed by visual language which has various message representations such as - iconic, indexical and symbolic representations [9]. Keng S. et al. has undergone the experimental study about how problem domain knowledge influences novice computer users' interpretation of icons [10]. This paper is also useful for the classification of icons into icon, index and symbol.

3 RESEARCH METHODOLOGY

There are two major activities involved in this research on evaluation of icons on Indian e-Governance Website. These activities are - selection of icons and lexical analysis.

3.1 e-Governance Website and Selection of Icons

There is an official website of the Indian Government, designed by NIC. The home page of this website is available at - www. http://india.gov.in [16] and is shown in Fig. 1. The content in this Website is the result of a collaborative effort of various Indian Government Ministries and Departments, at the Central / State / District level. This website has many sections such as Government, Citizens, Overseas, Sectors, Know India and Business. Each section has many sub-sections. Each sub-section is represented by an icon with a circular boundary.

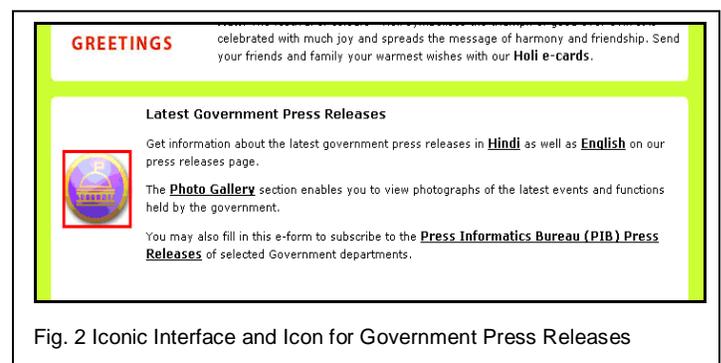


Fig. 2 Iconic Interface and Icon for Government Press Releases

There is a newsletter section on the Indian e-Governance Website. This section provides information regarding Citizen Services, Travel Information, Government Press Releases and New Happenings in India [16]. Fig. 2 shows the information about Latest Government Press Releases, which can also be viewed in Indian national language - Hindi. Such information is indicated by related icon, highlighted by red square in Fig. 2. This icon has a prominent government building as an indicator [16].

Indian e-Governance Website contains the sectors section which has sub sections such as Commerce & Industries, Rural

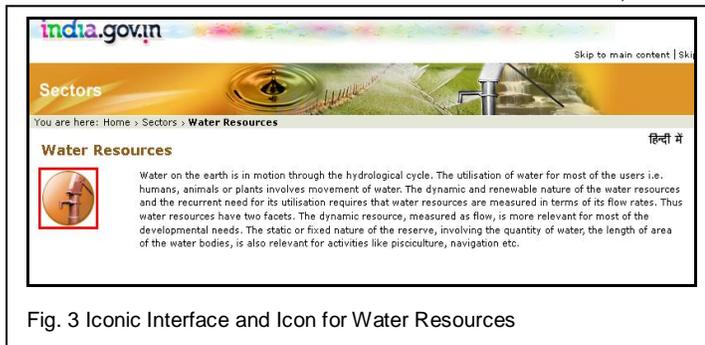


Fig. 3 Iconic Interface and Icon for Water Resources

Development, Communications & IT, Water Resources, Science & Technology, Defense, Education etc. The section - Water Resources is indicated by an icon, which is highlighted by red square in Fig. 3. This icon has hand-pump as an indicator to water resources.

Indian e-Governance Website contains many icons for several sections such as Acts, Education, Water Resources, Government Press Releases etc. The icons have various standard parts such as border, background, label, size, shape etc. Many icons have circular or rectangular shape. We have observed that many icons have a background as an important characteristic. For example, the icons in Citizen section have a red background whereas Government section has icons with sky blue background. Likewise, other sections are having the relative color code.

There are a lot of icons on Indian e-Governance Website, but it is not possible to analyze all of them. So, for this study, we have selected 12 icons based on their characteristics. The characteristics which we have used for selection of icons, are categories into two parts. The First part has primary / compulsory characteristics and the second part has secondary / optional characteristics [5]. Though, the icons may have more than 40 characteristics, but for selection, we have used the 5 primary and 4 secondary characteristics.

We have selected the icons from Indian e-Governance Website by applying following characteristics:

Primary Characteristics:

1. **Labels Off:** Labels are not displayed or required.
2. **Size:** Size is a dimension or magnitude of any object.
3. **Shape:** Shape is an outline of any object.
4. **Synecdoche:** Synecdoche is use of familiar single or many parts / objects to stand for the whole content.
5. **Clarity:** Clarity is defined as a clear, understandable, informative and easy association with the message.

Secondary Characteristics:

1. **Document:** Document is a representation of data on paper. It is represented by folding of the page from one corner.
2. **Color Indicator:** In color indication, each color de-

noted by background, border or text may have a different meaning.

3. **Structural Analogy:** Structural analogy is a representation of important organization by inclusion of building object.
4. **Simplicity:** Simplicity is a quality of being simple, compact and not complex. i.e. icon is created by a simple object. If the icon has multiple objects, it leads to increasing complexity.

Icon	Icon Description	Icon	Icon Description
	Acts		Health & Family Welfare
	Schemes		Transport
	Differently Abled		Indian Tourism
	Education		Foreign Embassy
	Law & Order		Government Press Releases
	Water Resources		Citizen Services

Fig. 4 List of Selected Icons

All the icons which are selected in Fig. 4 are having characteristics as labels off, same size, circular shape, clarity and synecdoche using familiar single or many parts. Some of the icons are having characteristic such as document, color indicator, structural analogy and simplicity.

The characteristics which are compulsory for the icon selection are primary characteristics. For example, labels off do not have any text written on the icons [5]. All the icons are circular in shape. Good clarity means for the consistent & predictable display control of exact location, alignment and spacing of border, image margin and image area because of that they convey the message clearly.

The characteristics which are optional for the icon selection are secondary characteristics. For example, document which represent the data on paper. Document characteristic is used

in Acts, Schemes, Law & Order and Health & Family Welfare. Color indicator conveys the purpose. Acts and Schemes having blue background belong to Government section. Differently Aabled, Education and Law & Order icons having red background belong to Citizen section. Foreign Embassy belongs to Overseas section. Water Resources, Health & Family Welfare and Transport having brown background belong to Sectors section, Government Press Releases and Citizen Services having purple background belong to Newsletter section [16].

Selected icons from Indian e-Governance Website contain general, field-related information as well as standard repre-

sentations. These icons have a reasonable potential for relevant lexical analysis [4]. Therefore, these icons have been extracted from selected website for lexical analysis. The legibility of icons has been a vital issue during selection of icons. The set of selected 12 icons is shown in Fig. 4.

3.2 Lexical Analysis

We have used lexical breakup in lexical analysis of icons on Indian e-Governance Website. Lexical breakup in iconic representations [2] has been helpful in classification of e-

TABLE 2

ALTERNATIVE ICONS FOR SELECTED ICONS AVAILABLE WITH INDIAN E-GOVERNANCE WEBSITE

TABLE 1
LEXICAL BREAKUP AND CLASSIFICATION OF ICONS BASED ON LEXICAL ANALYSIS

Sr. No.	Icon	Icon Description	Icon Function	Lexical Breakup	Classification & Remark
1		Acts	To access the full text of all the Central Acts passed by the Indian Parliament	Pile of Thick Books	Index + Icon
2		Schemes	To provide people with easy & single point access to information about several welfare schemes of the Government	Folded Document + Pencil	Symbol + Index
3		Differently Aabled	To provide benefits to persons who have disabilities	Person in Sitting Position + Colored Circle	Index + Symbol
4		Education	To give comprehensive information on all levels of education	Graduation Cap + Rolled Degree + Red Ribbon	Index
5		Law & Order	To provide useful information regarding the Police & Judiciary system	Gavel + Pile of Thick Books	Index
6		Water Resources	To provide information about development & regulation of water resources	Hand Water Pump	Index
7		Health & Family Welfare	To introduce various health programs & policies to improve the standard of life	Red circle + White Cross + Paper Pad + Stethoscope	Index + Symbol
8		Transport	Responsibility of proving an efficient public transportation	Truck + Material	Index
9		Indian Tourism	To provide information about places to visit, tourism department, travel agents & transportation required for tourists or passengers	Chaise Beach Chair + Patio Umbrella + Sand	Index
10		Foreign Embassy	To provide a list of all Foreign Embassies and Consulates in India & the Indian Missions abroad	Buildings + Tower	Index
11		Government Press Releases	To get information about the latest government press releases in Hindi as well as English	Building with Dome + Flag	Symbol + Index
12		Citizen Services	Provides information and useful links to avail various citizen services	Question mark	Index

Sr. No.	Icon	Icon Description	Alternative Icon (A)	Alternative Icon (B)
1		Acts		
2		Schemes		
3		Differently Aabled		
4		Education		
5		Law & Order		
6		Water Resources		
7		Health & Family Welfare		
8		Transport		
9		Indian Tourism		
10		Foreign Embassy		
11		Government Press Releases		
12		Citizen Services		

Governance icons into mainly three categories: iconic (icons), indexical (indices) and arbitrary (symbols) [7, 9, 10, and 11]. An icon represents similar type of object. While index indicates about a particular object or process through indirect means, the symbol is a sign which is used for representation of objects or process through convention or standard. The table 1 shows the lexical breakup and classification of all selected icons based on lexical analysis. For example, consider an icon for Differently Abled Persons. Its lexical breakup has a person in sitting position and a multicolored circle, which indicates one's disability as if one is sitting on wheelchair. So, it is indexical and it is symbolic also as it is used to show all types of disabilities in differently ables persons. There is another icon for Government Press Releases. Its lexical breakup has building with a dome along with a flag, which indicates a government authority. So, it is indexical and it is symbolic also as it is used to show the Government Press Releases. In which press releases are not accommodated as a visual element in any form.

4 DISCUSSION

Following various activities are involved in study of the Indian e-Governance icons with the main emphasis on lexical analysis. From the study of lexical breakup of icons [4], we have observed that all icons are not iconic. Majority of icons are indexical, four of them tend to be icon or symbol. As most of the icons are indexical, people may find it difficult to recognize them. Though Indian e-Governance Website is designed by keeping the diversified population in mind, there is a need to improve on icon design to make it possible to reach those sections of the society which have remained tangential to the government sphere due to various reasons like geographical challenges and lack of awareness [19]. In India, still majority of the people do not know about how to handle the information presented on the website, especially if it is in English, which may not be understood by public. Under such circumstances, an iconic interface may be useful during their interaction with Indian e-Governance Website. There are certain icons which appears to be better in this study on Indian e-Governance Website such as Acts, Schemes, Water Resources, Transport, Indian Tourism and Government Press Releases as they are either iconic or symbolic indices, which are easy to understand or quite popular.

All icons can be represented through alternative icons, which are shown in table 2. A 'list (A)' represents alternative icons taken from the e-governance websites of the different countries such as USA, China, Russia and France [14, 17, 18, 19, 20]. Another 'list B' represents alternative icons extracted from other websites searched through 'Google Image' and 'Yahoo Image'. The icons are available for better representation of some entities like Acts, Differently Abled [12], Health & Family Welfare and Citizen Services. For example, alternative B provided for Differently Abled icon includes visual representations for limb as well as sense (blind, deaf and dumb) disabilities.

5 CONCLUSION

Our study has following findings:

1. The icons in Indian e-Governance Website are classified as icons, indices and symbols.
2. All of the selected icons have indexical features in them and therefore, they may not be easy to understand to users of Indian e-Governance Websites, who may be users from public and from weaker socio-economic or educational background.

In future, there is a requirement to design / select better iconic representations for inclusion in Indian e-Governance Website for related activities / sectors.

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