A Survey on Text to Pictographs Communication

Shikha Suryavanshi[1], Kamlesh Chopra[2], Pratyush Sharma[3]

[1]PG Scholar, Malwa Institute of Technology, Indore MP, India
[2]Sr. Assistant Professor, Dept. of Computer Science, Malwa Institute of Technology, Indore, MP, India
[3]Sr. Assistant Professor, Dept. of Computer Science, Malwa Institute of Technology, Indore, MP, India

---***---

Abstract - *This paper describes different text to pictograph systems and its issues for people who are unable to read and write, but still want to communicate with the outside world. A pictogram is also called a pictogramme, pictograph, or simply picto. In internet activity an icon is an ideogram that conveys its meaning to a physical object through its pictorial resemblance. Pictorial communication systems convert natural language text into pictures to assist people with limited literacy.*

A picture can be understood by all the people in the same way, replacing the multitude of linguistic descriptions with one, virtually universal representation. There is no denying the value of the digital world in various facets of our lives. Throughout the world, people with cognitive disabilities can increase their quality of life by reducing social isolation by using intranet or internet independently. This paper describes the different related work in the field of pictograph. It also describes Modular Structure of PictNet, Pictogram Communication and issues in pictograph communication.

1. INTRODUCTION

People who face difficulties in reading and writing in the world uses pictograph communication environment to interact easily with the other persons over the internet or intra net. In these environments, people give input as text and generate pictograph and then send these pictograph to other person. This allows sending emails to other persons with the help of pictograph. In this, first input is given as a text (encoded) and then the text is converted into pictogram then it travels at receiver side and gets converted into pictograph (decode).

Pictograph system manly consists of three components (1) the story processing and image selection, (2) the estimation of similarity between pairs of images based on their visual and lexical features, and (3) the mutual reinforcement-based rank estimation process.

There are manly three types of picto-graphic communication [14] first universal picto- graphs, second pictographs for people with disabilities, third emoticons. Examples of universal pictographs are road symbol, sign boards at railway station, and many gamer like football, cricket, chess, includes systems for AAC. Third category emoticons use Kaomojiis and Emojis for representing text message.
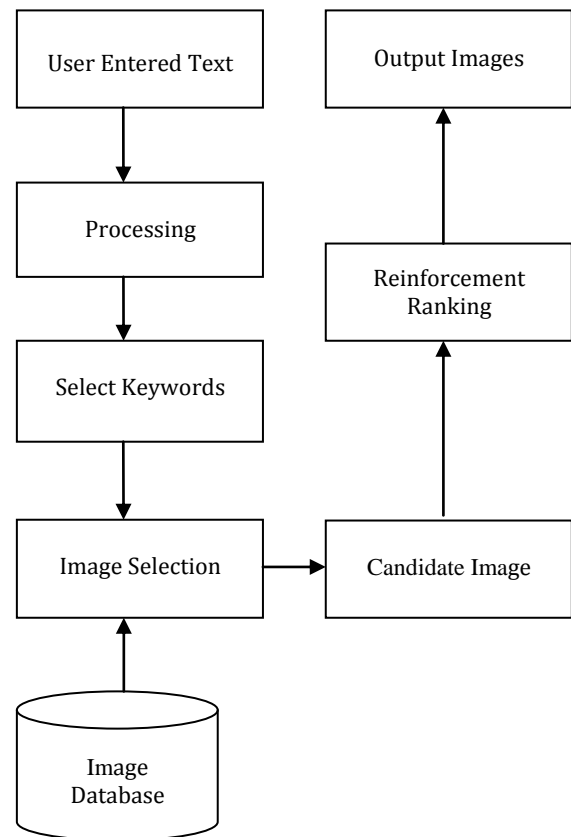

Fig- 1: Flow diagram of Pictograph System

Kaomjiis is the Japanese word which means emotion. For example, ^ -^ is used for happy face. An Emoji used to transfer message in the web world is called pictograph. In Emojis there are many icons, picture etc. used for communication. It uses a very large range of standard pictographs for communication. The pictograph input method allows users to first select the key category (such as home, snacks) before entering the second level where they can select the actual pictograph. In pictograph there are some words not converted into pictograph set such as sclera articles. It is far from ideal and needs more work that should lead to a more appropriate method of pictograph data.

The two pictograph sets that generally use the communication system are Sclera and Beta. Both are used by AAC for the disabled persons who are illiterate and cannot be social due to intelligence disabilities (ID). The system

provides a communication platform for such a person where they can serve with their disabilities.

Beta pictographs are the colorful pictures available at some cost. They are simple pictographs as compared to sclera complex pictographs.
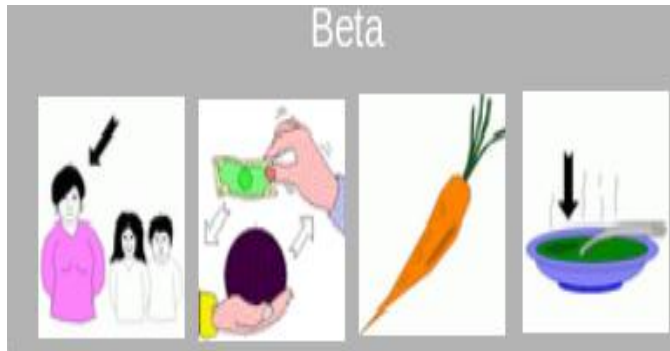

Fig- 2: Beta pictograph for "Mom bought Carrot Soup".

Sclera is the set of black and white pictographs which is freely available online and used for directives as we faced in our daily life.
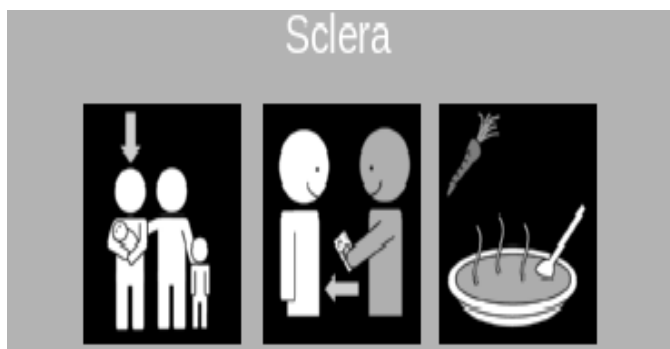

Fig- 3: Sclera pictograph for "Mom bought Carrot Soup".

1.1 Issues

There are two key problems that need to be discussed to establish pictogram communication network for people in the world.

First a pictogram repository is required which is easy for system administrators to manage and easy for users to search for. There are three broad categories of search functions in the current pictogram systems. Those are displaying a full list of pictograms, simple text matching and categorizing the pictograms semantically according to their meanings. Each pictogram not only has a primary significance, it is often burdened with peripheral context knowledge, such as cultural meanings and special expressions, both directly and indirectly. Cross-cultural and cross-lingual are use of this pictogram communication method targets. Hence, only providing a one-to-one mapping between each definition and

its corresponding pictogram does not meet the needs of both repository pictogram administrators and users of children. To prevent the breakdown of the pictogram database system due to its variety of structures, this repository must be easily accessible and searchable.

Secondly, to increase the scalability of pictogram repository, a consistent framework of concepts is needed. While children users are allowed to add or modify pictograms (Image file) on their own as a PictNet policy, only pictogram administrators are permitted.

The fundamental challenge is the proper semantic transliteration of words. The machine is unable to determine the different meanings a certain string can have when applying simple string mapping, leading to inaccurate pictograph decoding, and likely ill communication.

2. Literature Survey

Pictographic communication has evolved from local projects some of which have spread to include wider communities.

1) This research paper describes how it built and created the Communicator, the communication device for pictograms. Software and ICT system development comes together through the Pangaea action list, facilitation know-how and field operation flow to give the best performance toward its mission. It also describe three types of pictographic styles used for communication [1]

2) In this paper Pictographs enable communication with pre-literate or illiterate people. It presented two text-free user interfaces applied to the particular applications of providing information about employment opportunities for domestic laborers and a digital map designed for illiterate and semiliterate subjects.[2]

3) In this paper makes two main contributions. First, it proposes an approach to augmenting dictionaries with illustrative images using volunteer contributions over the Web. The paper describes the PicNet illustrated dictionary, and evaluates the quality and quantity of the contributions collected through several online activities. Second, starting with this illustrated dictionary, the paper describes a system for the automatic construction of pictorial representations for simple sentences. [3]

4) In this paper propose a family of intuitive "ABC" layout, which represent icons in three groups. It formalizes layout optimization as a sequence labeling problem, employing condition random fields as it machine learning method. In this method give sequence of pictograph as an input then how it improves the meaning of pictograph sequence as output. [4]

5) In this paper present an unsupervised approach to automated story picturing. Semantic keywords are extracted

from the story; an annotated image database is searched. Thereafter, a novel image ranking scheme automatically determines the importance of each image. Both lexical annotations and visual content play a role in determining the ranks. Annotations are processed using the Wordnet. How an unsupervised learning used for converting pictures to a sentence. [5]

6) In this paper describe and evaluate a text-to-pictograph translation system that is used in an online platform for Augmentative and Alternative Communication. It show large improvement over the baseline system which consisted of straight forward string-matching between the input text and the filenames of the pictographs. [6]

7) In this paper initial comparisons with collections created by ontology engineering and text extraction approaches. It analyze in detail how contributor statements are distributed and the impact of this distribution on coverage. It also suggests possible indicators of acceptability of knowledge and analyzes their merits based on the data collected. For statements contributed 2 or more times, it accuracy is 89.8%, which surpasses the results from text extraction. [7]

8) In this paper describe how system can allows conveying knowledge through language barriers. It used NLP on the domain of informal online texts, with emphasis on Machine Translation. It show improvements on several NLP tasks, both syntactically and semantically oriented, using both the crawled data and proposed character-based models [8]

9) In this how to Dutch database linked to Princeton word network with the help of a lexical-semantic. The combination of the two lexical resources (the Dutch Wordnet and the Referentie Bestand Nederlands) will result in a much richer relational database that may improve natural language processing (NLP) technologies, such as word sense-disambiguation, and language- generation systems. In addition to merging the Dutch lexicons, the database is also mapped to a formal ontology to provide a more solid semantic backbone. [9]

10) www.pictogram.se is show that the lexical ambiguities in pictograph communication system. It also shows that wrong communication into pictographs system. WordNet provides a more effective combination of traditional lexicographic information and modern computing. WordNet is an online lexical database designed for use under program control. English nouns, verbs, adjectives, and adverbs are organized into sets of synonyms, each representing a lexicalized concept. [10]

11) In this paper basic learning from text in pictographs representation. It has extended pictures-in-text conclusions to alternative media and technological formats and has begun to explore more systematically the "whys," "whens," and "for whoms" of picture facilitation, in addition to the "whethers" and "how muchs." [11]

12) If the people are not able to communicate with other in text formats then Text free communication system are used. The text-free UI is based on many hours of ethnographic design conducted in collaboration with a community of illiterate domestic laborers in three Bangalore slums. An ethnographic design process was used to under-stand what kind of application subjects would be interested in, how they respond to computing technology, and how they react to specific UI elements. [12]

13) The incoming textual message undergoes shallow linguistic processing, which is a process consisting of several sub-processes. The result of this shallow analysis on the example sentence is shown in Figure
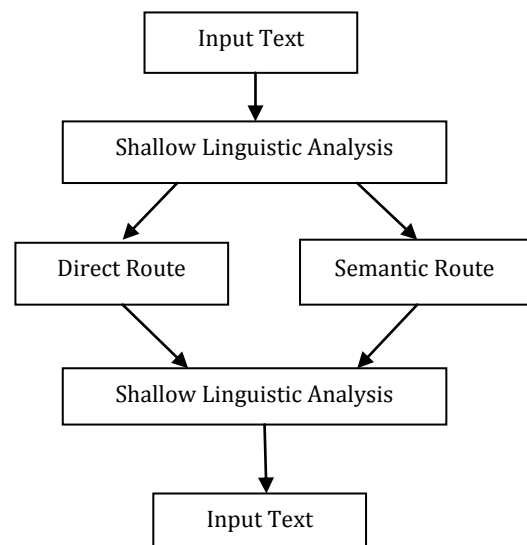

Fig- 4: Architecture of the Text2Picto Translation Engine

The conversion of a word into a pictograph can go along two different routes. First direct route, this mechanism allows bypassing the semantic analysis via Cornetto and provides a direct link between token/lemma/tag and the names of the pictographs. [15] Second semantic route, this mantic route only applied in the case of content words. It consists of Semantic Analysis, connecting the input text to Cornetto synsets. When words cannot be converted into pictographs by either route, we copy the textual input word to the output, only in cases of content words or words that are necessary to understand the message, such as, in some cases, prepositions. The final step consists of choosing the optimal path, choosing which pictographs are displayed.

3. EXISTING PICTOGRAMS

3.1 Pictogram as Universal Signs

Universal signs are most commonly used as pictograms for example board sign, direction boards at railway station, and in the various game play in the world. The aim of

pictograms is to provide necessary information and call attention to audiences. Pictograms are designed in such a way that there meanings are easily understood. Every message has one pictogram. [4]

3.2 Pictograms for Augmentative Alternative Communication

Quite enough hard work has now been put on creating symbols for Augmented Alternative Communication. Augmentative Alternative Communication an understand of communication to assist people with physical communication disabilities to be more socially active in intercultural communication, developing, education, social activities, job opportunities, volunteering. Sign language is good examples of AAC. Some pictogram communication systems exist among the different methods at AAC, such as Blis symbolic.

3.3 Pictograms to Decorate Text Messages

ASCII characters are used to reprinting combination of emoticon as pictograph communication such as "-:)" in email or message communication in personal computer and cellular phone in the world. In some cases non emotional concepts are used in pictograph representation. In most of the cases pictograph are used in the any place of the sentences.

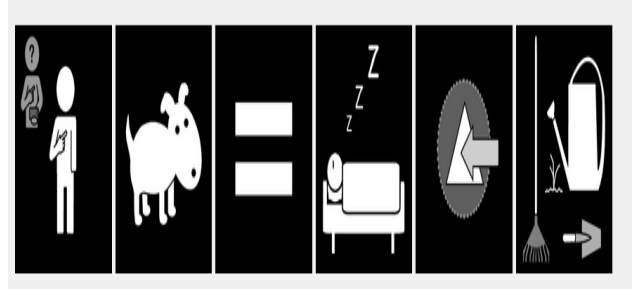## 4. PICTOGRAM COMMUNICATION

4.1 Pictograms

The established pictogram platforms, which were briefly clarified in the previous section, are largely designed to also have a one-to one mapping between each concept and pictogram so that a single concept can be extracted from a pictogram for all. There is no more than one pictogram symbol in such a repository which indicates the same meaning. It is natural to have such rule, because these pictogram systems were meant to build a common communication medium for their user. Universal signage systems are for all users to accurately 'receive' a message based on one-way communication.
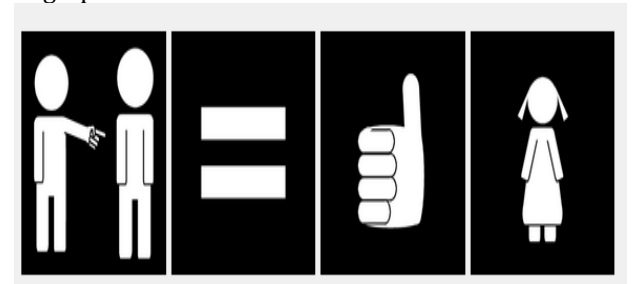
4.2 Pictogram Communication

If we give input as a word of sequence then it generates pictogram for that sequence. If we give input text in "English language" and "Sclera" is your target pictograph set. [9]
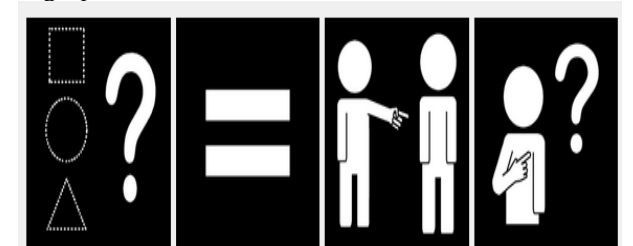
Example 1:
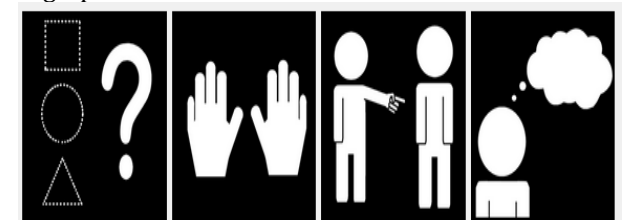Input: "My dog is sleeping in the garden."
Pictograph:

Example 2:
Input: "You are a good girl."
Pictograph:

Example 3:
Input: "what is your name?"
Pictograph:

Example 4:
Input: "what do you think?"
Pictograph:

5. PICTNET- STRUCTURE

PictNet is pictograph communication system, and it consists of the following elements.

5.1 Pictograph Semantic Wrapper by Topic Maps API

Topic Maps API's Pictograph Semantic Wrapper is a general Java implemented API that allows software to manipulate a repository of pictographs. In the Topic Map a pictograph repository based on Word Net semantics is defined.

5.2 Pictograph Annotator

Pictogram Annotator is a client application that helps permitted pictogram admin to give full control of write and read access to the Pictograph database.

5.3 Pictograph Maker

Draw a pictograph at client side user used pictograph Maker. With the help of pictograph maker user can draw, edit and manage pictograph.

5.4 Pictograph Communicator

With the help of pictograph communicator user can create pictograph message, also it can send and receive email. It also supports to create set of pictograph. It also supports client server servicer.

5.5 Pictograph Service at Server Side

There are many services used by the Pictograph server. All clients send the request to the server and server serves all requests.

6. PROBLEM IDENTIFICATION

I) For searching similar types of Pictographs from 'N' number of pictograph (In data set) is so much time consuming. Time spend for searching similar types of pictograph form a large data set is comparatively high, due to which the performance of algorithm is degraded. We need an optimal path method by which we can improve the searching time of algorithm.

II) In the current system translation of text into pictographs can be done but in the system output is different from the output which is desired by user. Such a problem occurs in the system due to ambiguity. The ambiguity is occurs in the system which affects the output of pictograph. A system ambiguity is occurring due to parser limitations.

We can resolve the problem of ambiguity using Word Sense Disambiguation (WSD) tool and use a* algorithm to choose the optimal solution for given text input.

A* algorithm is well known algorithm for its performance and accuracy. A* algorithm find the best path subroutine, which takes as input Q and contain path P. This algorithm gives the best path using breadth first algorithm and give optimal solution using dijkstra's algorithm it can find the nearest path.

7. CONCLUSION

Thus in this paper, different issues of pictograph, its related work and its element used in pictnet for pictograph communication has been explained. The work done for people by existing pictograph has also been concluded. Pictograms as universal signs, pictograms for Augmentative Alternative Communication and pictograms to decorate text messages in existing pictograms have been discussed. Also, the pictnet structures with its elements have been discussed. The implementation of a higher order model for spelling correction should also result in further improvements. Using of syntactic parsers in input language improve the pictograph communication system. Further improvements are surely possible provided more research is done. Now, there are many ambiguities present in the existing system.

REFERENCES

[1] Takasaki, T., and Mori, Y. 2017. Design and development of a pictogram communication system for children around the world. In T. Ishida, S. R. Fussell, and P. T. J. M. Vossen(eds.) Intercultural Collaboration, pp. 193–206. Berlin, Heidelberg: Springer.

[2] Medhi, I., Sagar, A., and Toyama, K. 2006. Text-free user interfaces for illiterate and semi-literate users. In International Conference on Information and Communication Technologies and Development (ICTD), pp. 72–82. Berkeley, CA: Institute of Electrical and Electronics Engineers.

[3] Mihalcea, R., and Leong, C. W. 2009. Toward communicating simple sentences using pictorial representations. Machine Translation 22(3): 153–73.

[4] Goldberg, A., Zhu, X., Dyer, C. R., Eldawy, N., and Heng, L. 2008. Easy as ABC? Facilitating pictorial communication via semantically enhanced layout. In Proceedings of the 12th Conference on Computational Natural Language Learning (CoNLL), Coling2008 Organizing Committee, Manchester, England, pp. 119–26.

[5] Joshi, D., Wang, J., and Li, J. 2006. The story picturing engine — a system for automatic textillustration.ACM Transactions on Multimedia Computing, Communications and Applications 2(1): 1–22.

[6]   Vandeghinste, V., and Schuurman, I. 2014. Linking pictographs to synsets: Sclera2Cornetto.In N. Calzolari, K. Choukri, Th. Declerck, H. Loftsson, B. Maegaard, J. Mariani, A.Moreno, J. Odijk, and S. Piperidis (eds.),Proceedings of the 9th International Conference on Language Resources and Evaluation (LREC'14),pp. 3404–10, Reykjavik, Iceland: European Language Resources Association.

[7]   Borman, A., Mihalcea, R., and Tarau, P. 2015. PicNet: augmenting semantic resources with pictorial representations. In T. Chklovski, P. Domingos, H. Lieberman, R. Mihalcea, and P. Singh (eds.),Technical Report SS-05-03. Proceedings of the AAAI Spring Symposium on Knowledge Collection from Volunteer Contributors, pp. 1–7. Menlo Park, California: TheAAAI Press.

[8]   Mihalcea, R., and Leong, C. W. 2009. Toward communicating simple sentences using pictorial representations. Machine Translation 22(3): 153–73.9. Binglei, G., Jiong, Y., et al., 2015a. SQL energy consumption modeling and optimization research. J. Comput. Sci. 10, 202–207.

[9]   Vossen, P., Maks, I., Segers, R., and van der Vliet, H. 2008. Integrating lexical units, synsets,and ontology in the Cornetto Database. In N. Calzolari, K. Choukri, B. Maegaard, J.Mariani, J. Odijk, S. Piperidis, and D. Tapias (eds.),Proceedings of the 6th International Conference on Language Resources and Evaluation (LREC'08), pp. 1006–13, Marrakech, Morocco: European Language Resources Association.

[10] Miller, G. A. 1995. Wordnet: A lexical database for English. Communications of the ACM38(11): 39–41.

[11] R. Carney and J. Levin. Pictorial illustration still improve students' learning from text. Educational Psychology Review, 14(1):5–26, 2002.

[12] I. Medhi, A. Sagar, and K. Toyama. Text free user interfaces for illiterate and semi literate users. In International conference on information and communication technologies and development, pages 72–82, Berkeley, CA, 2006.

[13] Ota, Y.: Pictogram Design, Kashiwa Shobo (1987) (Japanese).

[14] Takasaki, T., and Mori, Y. 2007. Design and development of a pictogram communication system for children around the world. In T. Ishida, S. R. Fussell, and P. T. J. M. Vossen(eds.)Intercultural Collaboration, pp. 193–206. Berlin, Heidelberg: Springer.

[15] VINCENT V., INEKE S.,and FRANK V. Translating text into pictographs Natural Language Engineering 23(2): 217–244. Cambridge University Press 2015.