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Research Article

A Domain Based Approach for the Animated Cum Automated Modelfor Deaf and Dumb Using NLP

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Abstract: Deaf and dumb people are using the hand gestures for their communication throughout the world. To understand and animate the hand gestures, we can help in facilitate communication between computers and the under privileged. In this study we propose a domain based approach which will be helpful to design a model using NLP This model will be useful for the learning of the recent trends in the technology. The proposed model processes the user input and converts into parameters which will produce the actions or gestures by the animated character which can be understandable by the deaf and dumb. The desired animations can be done by the software. The accuracy of the actions or animations based on the parameters of the actions that we extracted from the given information or the text by the users.

Keywords: Conversational models, deaf and dumb software, gesture, language, NLP

INTRODUCTION

Hand Gesture animation is a relatively new research field and not much research has been done on this topic. In order to communicate with deaf dumb people, normal human should have some knowledge about sign language. To convey message in the form of sign language hand gestures are mostly used method. There is more number of models available to produce gestures for the terms which are used in daily life. But when the deaf and dumb people want to learn recent trends and technologies these models will not provide solutions for it.

The gesture can be classified into four type's iconics, metaphorics, beats and deictics. Iconics are "gestures of the concrete," exhibiting more or less transparent images of their referents (McNeill, 1992).

- **Iconics:** It is used by the humans for accompany their explanations to depict what they are referring to. For example, when somebody is asked how to find a building in a city, it is common to see the direction-giver depicting significant landmarks with the hands-the fork where one road joins another, the shape of remarkable buildings, or their spatial relationship to one another (Stefan, 2004).

Iconic gestures are closely related to speech, illustrating what is being said and painting with the hands, for example when a person illustrates a physical item by using the hands to show how big or small it is. Iconic gestures are different from other gestures in that they are used to show physical, concrete items.

- **Metaphorics:** Metaphorics gesture is difficult to predict or describe based on any available gesture taxonomy or theory of gesture-speech relations (Casasanto, 2008). Metaphoric and iconic gestures are generally triphasic. The gesture of pointing ahead to indicate the future is not unique to the gestures of human figures in stone; it also occurs in the spontaneous gesturing of living humans while speaking. Thought and ideas shared by cultural groups more specifically indicate the high relevance of gesture research for the study of metaphor in relation to thought (Cienki and Müller, 2008).

- **Beats:** Beat gestures are just that, rhythmic beating of a finger, hand or arm. They can be as short as a single beat or as long as needed to make a particular point. The following definitions can be found in the literature:
- They are typically made with short, quick movements in the periphery of the gesture space (Goldon-Meadow, 2003).
- Beats are gestures which have a fast movement forward followed by a fast movement backward. This can also be formulated as a hitting movement (Slakhorst *et al*., 2004).

Gestures that "are not random but convey to listeners information that can complement or even supplement the information relayed in speech" Iverson and Goldin-Meadow (1998). Beat gestures are used in words which have a significant role in the discourse. So

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that beat gesture is dissimilar to other gesture types (Chris, 2010).

When compare to all the above said methods to communicate the technological terms iconic gesture method is best method because they are closely related to speech. Our proposed model wants to animate the technical terms (Ex If-Else) so; it requires the gestures that incorporate the movement of arms and hands and general emotional state of the body of the technical terms.

RELATED CONCEPTS

There are about two million people are deaf and dumb in our world[1]. They are deprived from various social activities and also underestimated. These are al l happen due to the communication problems. Deaf and dumb are also interested in learning of new technologies, but the models will not provide any solution.

Our model can be a desirable interpreter which can help both communities in general and deaf and dumb. To design a model for deaf and dumb for their technology learning is a critical problem because when we consider a technical term, the meaning of them are entirely different from the literal meaning . When we want to communicate through the gestures of the animated character and should consider the technical and semantic meaning of it.

The model has to understand the semantic meaning of the text and then produces the animation. To understand the technical text we have used Open NLP Engine which will manipulate the text. [1]http://www.wfdeaf.org/databank:

- Processing the text using NLP
- Understand the semantic meaning of the text
- Produce the appropriate animation of the context

NLP: The role NLP in communication and personal development is very important.NLP has been defined in various ways of ten modelling the system for deaf and dumb. NLP appears to hold much potential for teaching and learning.

In our proposed model we have characterised an NLP approach for teaching and learning.

- Dynamic process in which meaning of the technical term is constructed through the feedback
- People act according to the way they understand and represent the world, not according to the way the world `is'.
- Of prime interest in NLPO are the ways in which people represent the world internally, through sensory imagery and language. NLP is particularly interested in the way internal representations are structured, both in themselves and dynamically NLP assume that the structure of internal representation shows regularities for and is unique to, each individual.
- NLP also assumes that there are systematic relationships between this structuring and that individual's language and behaviour.
- All communication potentially influences leaning. Crucially, teachers' language and behaviour influence learners on at least two levels simultaneously; both their understanding of the topic in question (e.g. the dynamic structure of their internal representations) and their beliefs about the world, including about teach (Paul, 2003).

Probabilistic model-naïve bayes: It's one of the most efficient and effective inductive learning algorithms for machine learning and data mining. Its competitive performance in classification is surprising, because the conditional independence assumption, on which it is based, is rarely true in real world applications (Zengchang, 2006).

Zengchang (2006) is the simplest form of Bayesian network, in which all attributes are independent given the value of the class variable. This is called conditional independence. It is obvious that the conditional independence assumption is rarely true in most real-world applications (Zhang, 2004). An advantage of NB's algorithm is that the state of the art in the text classification.

LITERATRE REVIEW

Yukiko *et al*. (2004) proposed a model that is based on the lexical and synchronizes information. It is more useful for judging gesture occurrence then local syntactic cues.

- The model contains the animation may not be synchronised with speech
- The model does not incorporates the general discourse level of information
- The model does not synchronized with generated gestures with appropriate timing for emphasizing the important words

Irene *et al*. (2003) presented an approach for the construction and animation of human hand models with underlying anatomical structure.

- It is built around a reference hand model using muscle contraction values
- It is very complex model because it plays an important role for the computation of bone position from a given muscle contraction values

Figure 1 shows the proposed model architecture. It consists of various levels of processing. The proposed model contains the following modules:

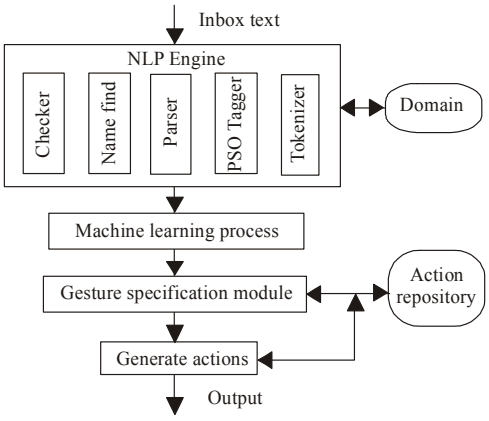

Fig. 1: Automated model for deaf and dumb

- Language Specification Module (LSM)
- NLP Module
- Gesture Specification Module (GSM)
- DB Module
- Action Framework

- **Language specification module:** This module contains the technical terms that are used in our actions framework for example break, continue. These terms can be denoted as:

$$DS_i = (t_0, t_1, t_2, \ldots, t_n) \quad (1)$$

where
Ds = The Domain specification which deals with the area of knowledge to be expressed as gestures for the deaf and dumb people
i = The domain index takes the values from 0 to n
t = The term in a domain DS_i

- **NLP module:** This module consists of number of components that identifies the keywords or the technical terms. These components are derived from the Open NLP Engine tool namely Checker, Name find, Parser, POST agger, Sentence Detect, Tokenize, Util.
  The subject and action of the text is parsed and they are inserted into the DB Module for the parameter optimization.

- **Gesture specification module:** This module processes the each and every gesture of the considered term into parameters. This parameter can be by action framework module:

$$GS_j = (a_0, a_1, a_2, \ldots, a_m) \quad (2)$$

$$a_k = (\langle facial\ gestures(fg) \rangle \langle hand\ gestures(hg) \rangle \quad (3)$$

where,
GS = The gesture specification of an action
j = The term index takes the values from 0 to n
a = The action for a term GS_i

$$fg = (fp_0, fp_1, fp_2, \ldots, fp_l) \quad (4)$$

$$hg = (hp_0, hp_1, hp_2, \ldots, hp_r) \quad (5)$$

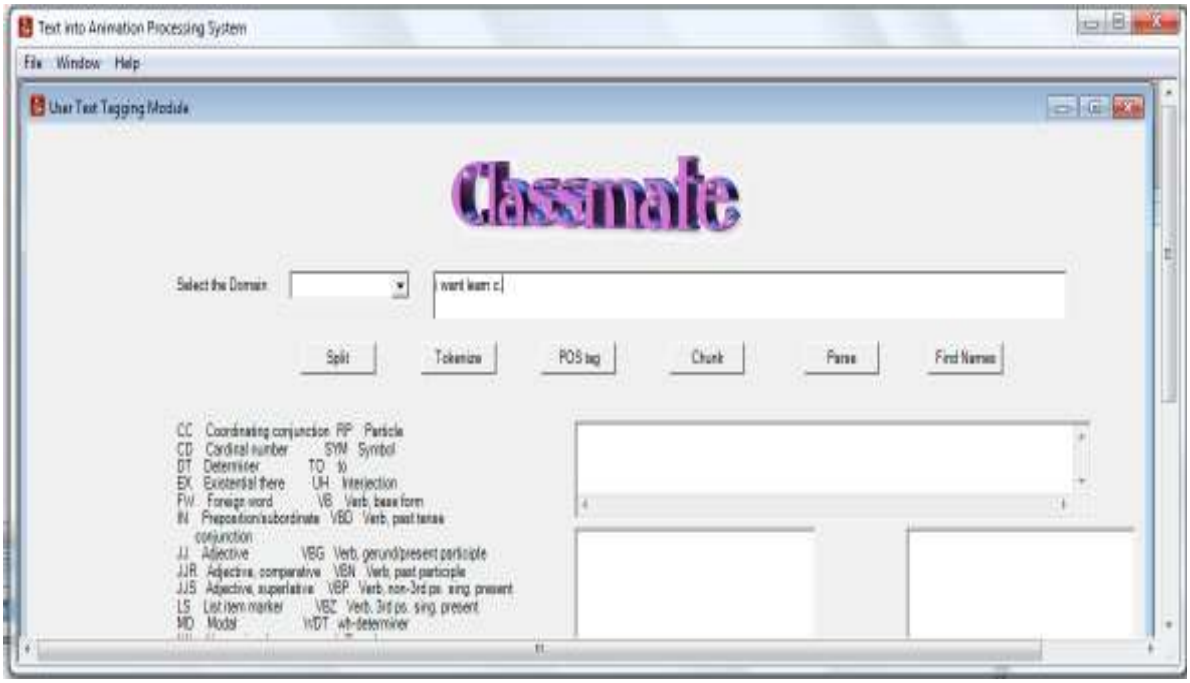

Fig. 2: Text parser module

Fig. 3: Text to animation module

where, fg and hg are the facial and hand gestures for the gesture involved in an animation, Eq. (4 and 5) defines the parameters of respective gestures.

- Proposed model architecture
- Algorithm for the proposed model

Procedure teach me now (string input) begin

- Read the input text related to particular domain
  - The entered text is parsed by the NLP module and it produces the list of words to be represented as a gesture
- Understand the meaning
  - The identified action term may refer the same meaning.
- Derive the actions
  - After identifying the appropriate term then determine the action
- Specify the parameters for the actions
  - To generate the determined action parameter list has to be produced using the Eq. (2)
- Enable the action from the action repository
  - It contains the set of key action related to particular domain
  - If a_k = key-actions then

        Perform the actions
        Convey the meaning

Else

        Perform the actions for unknown word
        Convey the meaning

- Repeat the step 1 through 7

End

- **Evoluation and output:** The Fig. 2 and 3 shows the output screen shots of the proposed model. User has to give the input to learn the technique related to particular domain. The following module analyses the give text and then sends the parameter list to produce the gesture for the term.

The accuracy of the gesture can be produced according to the parameters list produced.

CONCLUSION

The proposed model is an efficient model in the case domain what we have taken contains the terms which are not in more technical to produce with complex gestures. If it contains the more complex terms then it will be very difficult. Since we have considered only simple terms with simple gestures can only be possible by our model. BEAT is a well-known framework for the automatic generation of gestures by animated characters (Cassell *et al*., 2001). Despite its name, BEAT only generates beats when no other gesture is available. However, our findings show that this approach is too simple.

Future work of our model can be extended with the concept of AI so that gesture can be unique for the technological term more over we planned to incorporate the concept of ontology in to this model so that semantic web resources can accessed and also model can also be available as a web application so that in can be help full for people of the world wide.

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