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A Review on Language Identification System

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Abstract: Language identification system is immensely required in today's scenario. A review of literature gives an idea of previous work done in this area. Present work has discussed all the basic details regarding the language identification system. It has also tried to give a common steps involved in language identification system.

Keywords: Language Identification system, Communication, Linguistic

1. INTRODUCTION

One of the issue in today's global world is the issue of using a language that is understandable to all. This is because people belong to different places and speak different languages. In such scenario, any method that resolve this issue will prove as stepping-stone. One such method is Language identification by which people can communicate each other effectively.

Among the various factors that define different cultures and communities, an important factor is language. The importance of speech and language for human-to-human communication can be over emphasized. Speech would thus be the most natural medium of interaction between humans and machines too. Language can be in the spoken or textual form.

Spoken Language Identification (Language Identification system) is the process of identification of the language spoken in an utterance irrespective of gender, pronunciation, accent and other speaker innate characteristics. Human auditory system is the most accurate language identification system. People are able to determine whether it is a language they know, within seconds of hearing speech. If it is a language with which they are not familiar, they often can make subjective judgments as to its similarity to a language they know.

Any utterance is nothing but an audio signal. Speech processing is the study of and processing methods of these audio signals. The signals are usually processed in a digital representation, so speech processing can be regarded as a special case of digital signal processing.

There are different aspects incorporated in speech, which can be employed to represent the characteristics of a language. The raw speech signal is complex and may not be suitable for feeding as input to the language identification system, hence the need for a good pre-processing arises. The task of this pre-processor is to extract all relevant acoustic information in a compact form. In other words, the pre-processing should remove all non-relevant information such as background noise and characteristics of the recording device, and encode the remaining (relevant) information in a compact set of features that can be given as input to the system.

2. A REVIEW OF PREVIOUS WORK

Berkling et al. [1] have dissected phoneme based highlights for dialect acknowledgment. They have played out the LID study in three dialects: English, Japanese, and German from OGI-MLTS discourse corpus.Tucker et al. [2] have directed LID experiments with the dialects having a place with same dialect family. Sub-word models for English, Dutch and Norwegian dialects have been created for completing the LID study. Kadambe and Hieronymus [3] have created LID frameworks utilizing phonological and lexical models to recognize the dialects. Hazen and Zue [4] have created programmed LID framework using the phonotactic, acoustic-phonetic and prosodic data inside a unified probabilistic system. K. Kirchhoff and S. Parandekar [5] have created LID frameworks in view of n-gram models of parallel floods of phonetic highlights and meager measurable conditions between these streams. J. Gauvain et al. [6], Shen et al. [7] proposed a novel strategy utilizing telephone cross sections for creating programmed LID framework. The utilization of telephone cross sections both in preparing and testing essentially enhances the exactness of a LID framework in view of phonotactics. Barroso et al. [8] have proposed hybrid ways to deal with fabricate LID framework in light of the determination of framework components by a few classifiers Support Vector Machines (SVMs), Multilayer Perceptron classifiers and Discriminant investigation. Siniscalchi et al. [9] proposed a novel all-inclusive acoustic portrayal approach for dialect acknowledgment. Widespread arrangement of key units has been investigated, which can be characterized over every one of the dialects.An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it.

3. PURPOSE OF LANGUAGE IDENTIFICATION SYSTEM

Spoken language identification system that can detect languages in an unbiased manner, not giving regard to who is producing those utterances and how it is pronounced.

The major function of the Language Identification system is to recognize the language of the speaker accurately. This task has nothing to do with understanding what the speaker is trying to communicate, which is the task of a Speech recognition system. Language Identification system can be used as a pre-processing stage for multilingual speech recognition, that is, the language of the speaker is identified prior to the recognition, with an Language Identification system which can switch between recognizers. This reduces the overhead of multilingual recognizers.

4. MISCONCEPTIONS

In general, people tend to misinterpret Language Identification systems as speech recognition systems. Hence, it becomes inevitable for us to illustrate the difference between the two. A speech recognition system aims at interpreting the content of the speech. Given speech input in a particular language, this system derives the meaning of the speech. This is done by first formulating a speech grammar into a model, which represents the rules and regulations of the speech in a particular language (very similar to text grammar).

The perspective of a Spoken language identification system is to identify language spoken in an utterance. The identification is independent of the content of the utterance. The identification should not consider the accent, pronunciation and other intrinsic characteristics of the speaker.

5. TYPES OF SPOKEN LANGUAGE IDENTIFICATION SYSTEM

The major task is to identify what features have to be extracted in order to discriminate between languages. Feature is a broad term with respect to speech signals. They could be acoustic features, prosodic features or phonotactic features.

Prosodic approach:

Within this approach, language is deciphered on the basis of stress that is being used in the language and the intonation that is being used in the language. Prosody depends on the components of discourse that are properties of syllables and bigger units of discourse. The different emotions of the person who is speaking as for example if the speaker is making a statement or the person is questioning or the person is giving a command can get reflected through prosody.

Phonotactic approach:

Phonotactic is the investigation of the manners by which phonemes that are the smallest unit of sound with the ability to be significant are permitted to join in a specific dialect. Phonotactics characterizes allowable syllable structure, consonant groups, and vowel successions by methods for phonotactic requirements. Phonotactic limitations are standards and confinements concerning the manners by which syllables can be made in a dialect. This approach turns out to be more important when the semantics of the dialect is completely known.

Acoustic approach:

In Acoustic, we think about the physical properties of discourse. The point here is to break down sound wave flags that happen inside discourse through differing frequencies, amplitudes and durations. One way we can dissect the acoustic properties of discourse sounds is through taking a gander at a waveform. Weight changes can be plotted on a waveform, which features the air particles being packed and thin, making sound waves that spread outwards. A tuning fork being struck can give a case of the weight variances noticeable all around and how the air particles waver when we see sound.

6. COMMON STEPS IN LANGUAGE IDENTIFICATION SYSTEM

There are some basic and common steps that are followed when we undertook language Identification system. These are commonly found in most of the models. We have tried to cite some common steps which are given below.

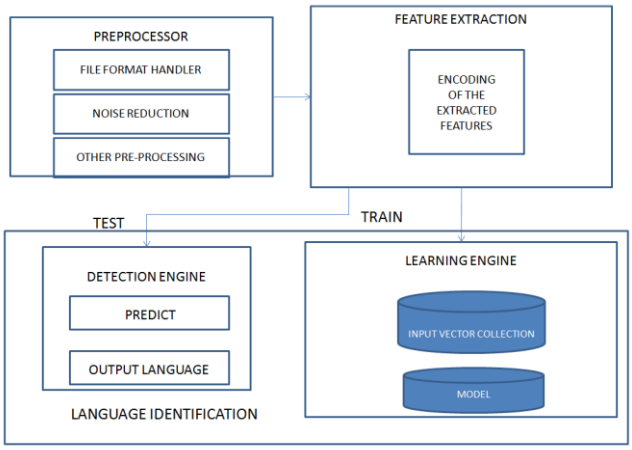

Figure: 1 Process of Language Identification System

Pre-processing

The progression of pre-processing includes the lessening of the noise in the background. At the same time it trims the sound samples to spans which are reasonable to extract adequate highlights. This progression ought not to be neglected as the exactness may change with the sort of displaying andspan. The pre-preparing is required to deal with dissimilarities in the information and merging them on basic the grounds.

Feature extraction

Feature extraction includes diminishing the quantity of assets required to depict an extensive arrangement of information. Examination with countless for the most part requires a lot of memory and calculation control, additionally it might make an arrangement calculation overfit to preparing tests and sum up inadequately to new examples. Highlight extraction is a general term for strategies for building blends of the factors to get around these issues while yet depicting the information with adequate exactness. There are multiple process involved in feature extraction, which are mentioned below.

We apply a window function to the input signal. Here, a window function is a numerical capacity that is zero-esteemed outside of some picked interim. Hamming and Hanning are the unmistakably utilized window function. Transformations are applied to shift domains. The recurrence area examination holds more prominent significance for sound handling; subsequently DFT, FFT is typically utilized. Additionally channels are utilized to inspect the sound flag in various frequency bands.

Language Identification

Language identification means determination of natural language that has been used in the text. There are multiple methods that are used to determine the natural language.

Hidden Markov Model

The Hidden Markov model is one the model used for language identification which is guided by the Markov property. The Markov property expresses that one ought to have the capacity to make expectations for the eventual fate of a procedure construct exclusively in light of its present state similarly as precisely as one could do as such by knowing the procedure's full history. For any model, there are three essential viewpoints, an information, states, and the yields. If there should arise an occurrence of a Hidden Markov model, the states are covered up while the yields are known. In any case, each state is mapped with certain likelihood over all the conceivable yields. Accordingly a HMM can be utilized to interpret the states or parameters behind a yield.

Gaussian Mixture Model

The Gaussian blend show gauges likelihood thickness capacities for every dialect and after that performs characterization in view of Bayes' run the show. The Baye's hypothesis is utilized to ascertain the likelihood of an occasion. Extrapolating this to the Language Identification framework situation the parameters of dialects test are occasion 2 and the dialect itself is occasion 1. Subsequently GMM can be utilized as a classifier for a Language Identification framework.

7. APPLICATIONS

The applications may vary. It could be for general use or for business purpose. Every one of them looking for a typical reaction of dialect identification. The Language Identification framework can be utilized as a part of any Contact Centre sending to pre-sort the guests in view of the dialect they talk with the goal that the required administration or IVR can be given in the dialect fitting to the guest. Worldwide call focuses would profit by this as guests from any piece of the world might be diverted to the focuses of their nearby local dialect without human mediation. The Language Identification framework can go about as a switchboard directing for approaching calls to administrators familiar with the dialect. Universally working organizations keep up client mind focuses to help their customers. Consequently such focuses handle dialect recognizable proof module in such focuses can assist steering the client's call to the dialect particular area. For example, a call from Germany can be consequently changed to a German capable administrator. This expands the effectiveness of the association's in understanding the client's issues.

It can similarly be utilized in hotel lobby to solve the queries of foreign delegates. Similarly, in Tourism Industry language identification has huge application. It can further be utilized in parliaments of countries where the parliamentarian belongs from diverse region but awareness of their own language only. It can save life also, when the rescue team visits in an area where they do not understand the language of the native people.

Dialect Identification framework can be utilized for any ordered web indexes and could be combined with multilingual discourse acknowledgment frameworks to switch between recognizers. Talked dialect elucidation and exchange frameworks are different administrations, which utilize Language Identification framework. Right now, AT&T and Language Line Services accomplice to give Customer Service Assistance in excess of 170 Languages.

8. CONCLUSION

Present paper gives an idea of language identification system while describing the different types and stages of language application system. It has been observed in the review of literature that excitation source has been discussed quite extensively. In the later part saw the misconception, advantages associated with the Language identification system.

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