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# A STUDY ON SECURE ONLINE VOTING SYSTEM IN BIOMETRICS USING VOTING USING DETECTION AND RECOGNITION

**S.Nasrin,**
**Guide: Dr.V.Palanisamy and R.Anandha Jothi**
Computer Science Dept, Alagappa University, Karaikudi.
Email: s.nasrindeen@gmail.com

**Abstract -** The purpose of this project is to develop an Online E-Voting system by speech detection.

Online voting (e-voting) would be more convenient, relatively secure and utilize fewer resources. To be able to access e-voting system from a personal, business or even a public library computer may be more convenient for many people needing to vote.

Voice Activity Detection (VAD) is a very important front end processing in all Speech and Audio processing applications. The performance of most if not all speech/audio processing methods is crucially dependent on the performance of Voice Activity Detection. An ideal voice activity detector needs to be independent from application area and noise condition and have the least parameter tuning in real applications. In this paper a nearly ideal VAD algorithm is proposed which is both easy-to-implement and noise robust, comparing to some previous methods. The proposed method uses short-term features such as Spectral Flatness (SF) and Short-term Energy. This helps the method to be appropriate for online processing tasks. The proposed method was evaluated on several speech corpora with additive noise and is compared with some of the most recent proposed algorithms. The ex-periments show satisfactory performance in various noise conditions.

## INTRODUCTION

In traditional elections, a voter usually goes to the voting stations. After direct person-person verification with some IDs, the voter is allowed to vote. The voter is then given a ballot which allows a single vote. Once the ballot is used, it cannot be used again. However, this ballot must also be anonymous. The ballot must identify the voter as being permitted to vote, but not reveal their actual identity, and the voter must also be given assurances of this. Traditional polling methods trust a lot of parties during the election. The current methods require an attacker interact directly with the voting process to disrupt it. There is a greater chance of getting caught as there will be physical evidence in the traditional polling.

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On the other end, internet is harder to control and manage the security as Network and internet related attacks are more difficult to trace. In the traditional polling, you know who is in the election room. Also with the internet or network related voting, from all around the world you will have attackers, not only by the few people in the room [3]. Figure 1 shows the hierarchy of the voting schemes just discussed [17].

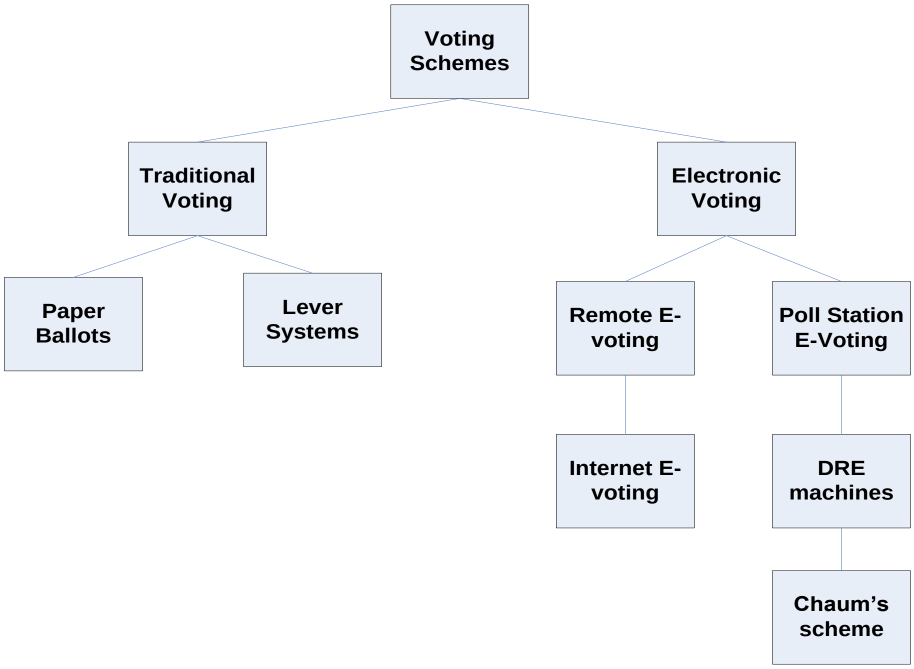


**Figure 1: The categorization of the voting schemes**

Another issue with e-voting is educating the voters. We can not consider that all the users are computer gurus and they will use the e-voting systems easily. When e-voting is designed it needs to be easy to use. We should consider the fact that a large portion of the voting public has a very little knowledge about the computers. According to some of the research done by the Public Policy Institute of California over 50% of 18-44 years of age voters prefers Internet voting

Some recent studies have focused on e-voting, its security concerns and making it more secure. Below is the list of related literature about e-voting:

LITERATURE REVIEW:

Electronic Voting Systems In this section, theory related to existing voting systems and technologies used are presented. This includes technologies for paper-based voting systems where electronic

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means are used to count the paper ballots, and technologies for electronically casting votes. Some of the technologies mentioned are older technologies used in less voting systems these days, while some are still in phases of development and testing.

Paper-Based Electronic Voting Systems Paper-based electronic voting systems are voting systems where the electronic mean of tabulation is used to count paper ballots. The votes are cast, or marked, on paper ballots by hand or using a marking device, and then an electronic tabulation device is used for counting. This can speed up the process of counting, and not only give less manual work but also less error regarded to human failure. To use the electronic mean of counting ballots, different types of marked paper ballots can be used to cast the vote, depending of what kind of electronic device that is used for tabulation. These systems include punch card voting, and the marksense and optical scanning systems.

Punch Card Systems

The use of punch cards for data handling is a technology that has been used since the 19th century . The punch card sorting and tabulation equipment was invented by a statistician named Herman Hollerith. It was first built to process the large amount of information from the 1890 US census, but later developed for commercial and scientific purposes, and also for voting.

The machinery of a punch card system consists of several components to carry out the processes. When having several decks of punched cards a card collator machine can sort and merge cards from different stacks according to certain factors, for instance adress or county. To sort/tabulate the cards with specific loads a sorting/tabulation machine can be used.

The punch cards are stiff cards or paper strips that are punched according to a certain value or designation. There exist a lot of different types of punch cards, of different sizes, with a different amount of punching locations, for different purposes. Punch cards were used as input for data processing in electromechanical devices like tabulation machines and unit record equipments, which was used before the invention of today’s electronic computers. These machines had a function of sensing punched holes with either electrical or optical sensors, and could have high-speed mechanical feeders that made it possible to process up to 2000 cards per minute. To generate a summary (report) of a deck of punch cards, they could be fed into the tabulation machine and selected fields from each card were added to the value of one or several counters in the machine

Optical Scan Systems

Optical scan is another technology that can be used for the counting of paper ballots, and was first applied to voting in the 1980s

An optical scan system used for voting is made up of the following 4 components

• Computer-readable ballots • Marking devices • Privacy booths • Computerized tabulation device The votes can be cast using a marksense system,

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but also using a computer or direct-recording electronic voting system

Systems to Electronically Cast Ballots

There exists a wide variety of e-voting setups for electronically casting a vote, ranging from the use of an electronic device inside a polling station to casting the vote from a remote location using a telephone or a PC transmitting the vote via the Internet. In this section I describe some of the systems and schemes used for casting electronic ballots.

DIRECT-RECORDING ELECTRONIC VOTING SYSTEMS:

A more recent invention used for elections is called direct-recording electronic (DRE) voting systems. This is an electronic implementation of the old mechanical lever systems, where the voters cast ballots by pulling down levers that correspond to each candidate or issue choice and each lever had a mechanical counter that recorded the number of votes for that position. The DRE machine was first introduced in the 1970s and is still used in elections shows a picture of an example DRE machine at a polling station. The DRE voting system is a computer on the precinct with a screen to display the ballot and an input device in the form of push buttons or a touch screen. The machine processes data with computer software and records voting data and ballot images in memory components. The DRE machines can also be used for just the casting of the vote, and then print a ballot for tallying if other electronic tabulation techniques like optical scanning is used. The ballot information is prior to the election programmed into electronic memory storage and uploaded to the machine. The screen displays the electronic ballot and the voter registers his choice of vote directly into the system.. The vote is saved on an electronic storage medium together with the other votes cast on the machine. The tally can be performed at the precinct and the result transmitted, or all the votes can be saved on a removable storage medium and transported to a centralized location for tallying.

One advantage with the use of a DRE voting machine is that the vote is stored directly into the machines memory and saved for electronic tallying, and the DRE system can later also print a record of ballots cast to produce a paper audit trail if necessary (Voter Verified Paper Audit Trail (VVPAT)). Another advantage is that the voter can print a ”receipt” after casting the vote to verify to himself that the correct vote was registered. One concern, as mentioned before, when not printing an audit trail, is that it is easier to lose an electronic ballot than a physical paper ballot if an error occurs.

PUBLIC NETWORK DRE VOTING SYSTEMS:

As explained, a DRE voting system is an election system that uses DRE machines to display electronic ballots, and the voter cast his vote directly into the storage memory using for instance a touch screen. A public network DRE voting system can use a DRE machine (computer) at the

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polling station for the casting of the vote, but after the vote is cast the system can transmit the vote date from the polling place to another location over a public network [27]. By this the public network DRE voting system can utilize either precinct count or a central count method. The vote data may be transmitted as individual ballots as they are cast or as one batch when the polls close. The vote data may also be transmitted periodically as batches of ballots throughout the Election Day to support an updated result at all times. At the central location vote data from several precincts are added up. Public network DRE voting system not only includes casting the vote from a computer at the polling station, it also includes remote voting as Internet voting and telephone voting.

REMOTE VOTING:

Voting over the Internet can be done from remote locations using a computer connected to the Internet. The term Internet voting could also imply the use of traditional polling locations with voting booths consisting of voting systems connected to the Internet. But when referring to Internet voting in this thesis we mean votes cast from a remote location, for instance through the web browser of your home computer, via the Internet. These Internet voting systems are also called cryptographic voting systems.

Internet voting is a type of absentee voting which means the voter can use any personal computer with Internet connection to cast the vote, and it is sent to be stored in the election system [28]. This is regular Internet users with personal computers installed with standard operating systems and software. To vote over the Internet the voter needs a digital signature to log into the system, for instance identify himself with a PIN code and/or a smart card and then the particular ballot for an election he can participate in is showed. The voter submits his choice and the encrypted ballot is transmitted over the Internet to a remote server (an electronic ballot box) of the election system.

SMS is another mean of casting votes over the GSM network [29]. This is a non-interactive method compared to the ”calling method”, where voting is performed in one text message. A ”SMS vote”, in this example scheme, had to include the voter’s code, a district code and the code to the candidate voting for. After transmitting a valid vote, the system sent back a SMS confirming the vote was recorded. The receipt did not say anything about which candidate the voter voted for.

END-TO-END VERIFIABLE VOTING SYSTEMS:

The newest development in the area of voting systems is end-to-end (E2E) verifiable systems, also called open-audit voting systems. The last few years have witnessed the emergence of end-to-end voting systems, which enable voter-verification of election outcome [32]. The purpose of E2E systems is primarily to improve election integrity through E2E verifiability.

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PROPOSED VAD ALGORITHM:

The proposed Algorithm starts with framing the audio signal.in our implementationno window function is applied on the internt.First N Frame are used for thresshold initialization.For each incoming speech frathe the three features are computed.The audio frame is marked as a speech frame, if more than one of the feature values fall over the precomputer threshold.The complete procedure os the proposed method are described below:

Proposed Voice Activity Detection Algorithm

1- Set Frame _ Size = 10ms and compute number of frames

( Num _ Of _ Frames )(no frame overlap is required)

2- Set one primary threshold for each feature {These thresholds

are the only parameters that are set externally}

- Primary Threshold for Energy (Energy _ PrimThresh)
- Primary Threshold for F (F _ Pr imThresh)
- Primary Threshold for SFM (SF _ Pr imThresh)

3- for i from 1 to Num _ Of _ Frames

3-1- Compute frame energy (E(i)) .

3-2- Apply FFT on each speech frame.

3-2-1- Find $F(i) = \arg\max_{K}(S(k))$ as the most dominant frequency component.

3-2-2- Compute the abstract value of Spectral Flatness

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Measure (SFM (i)) .

3-3- Supposing that some of the first 30 frames are silence, find the minimum value for E $(Min\_E)$, F $(Min\_F)$ and SFM $(Min\_SF)$ .

3-4- Set Decision threshold for E , F and SFM .

- $Thresh\_E = Energy\_PrimThresh * \log(Min\_E)$
- $Thresh\_F = F\_PrimThresh$
- $Thresh\_SF = SF\_PrimThresh$

3-5- Set Counter = 0 .

- If $((E(i) - Min\_E) >= Thresh\_E)$ then Counter + + .
- If $((F(i) - Min\_F) >= Thresh\_F)$ then Counter + + .
- If $((SFM(i) - Min\_SF) >= Thresh\_SF)$ then Counter + + .

3-6- If Counter > 1 mark the current frame as speech else mark it as silence.

3-7- If current frame is marked as silence, update the energy minimum value:

$$Min\_E = \frac{(Silence\_Count * Min\_E) + E(i)}{Silence\_Count + 1}$$

3-8- $Thresh\_E = Energy\_PrimThresh * \log(Min\_E)$

4- Ignore silence run less than 10 successive frames.

5- Ignore speech run less than 5 successive frames.

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## CONCLUSIONS

The main goal of this paper was to introduce an easy to im-plement Voice Activity Detection which is both robust to noise environments and computationally tractable for real-time applications. This method uses short-time features of speech frames and a decision strategy for determining speech/silence frames. The main idea is to vote on the re-sults obtained from three discriminating features. This me-thod was evaluated on four different corpora and different noise conditions with different SNR values. The results show promising accuracy in most conditions compared to some other previously proposed methods.

There are two minor deficiencies for the proposed method. First, this method is still vulnerable against certain noises such as car noise. This flaw can be solved by using some other features which are more robust to this condition.

The second defect of the proposed method which is also minor but can be decisive for some applications is its rela-tively lower average speech hit rate, specially compared to G. 729 VAD standard. This flaw may be solved with some revisions in VAD algorithm for example possibly by incor-porating fuzzy terms in the decision process

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