Steganography Using Audio File Part 2

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Fourth Stage

Lecture 7

2 SPREAD SPECTRUM

- In the context of audio steganography, the basic spread spectrum (SS) method attempts to spread secret information across the audio signal's frequency spectrum as much as possible.
- This is analogous to a system using an implementation of the LSB coding that randomly spreads the message bits over the entire sound file.
- However, **unlike LSB coding**, *the SS method spreads the secret message over the sound file's frequency spectrum*, using a code that is independent of the actual signal.

3 SPREAD SPECTRUM …CON.

- As a result, the final signal occupies a bandwidth in excess of what is actually required for transmission.
- **Two versions of SS** can be used in audio steganography: **the direct-sequence** and **frequency-hopping schemes**.
- **In direct sequence SS**, the secret message is spread out by a constant called the chip rate and then modulated with a pseudorandom signal. It is then interleaved with the cover-signal.
- **In frequency-hopping SS**, the audio file's frequency spectrum is altered so that it hops rapidly between frequencies.

4 SPREAD SPECTRUM …CON.

- The SS method has the potential to perform better in some areas than LSB coding, parity coding, and phase coding techniques in that it offers a moderate data transmission rate while also maintaining a high level of robustness against removal techniques.
- However, **the SS method shares a disadvantage** with LSB and parity coding in that **it can introduce noise into a sound file**.

5 PROPOSED TECHNIQUE

- The algorithm is based on the redundancy of bits in binary code of numbers, lowercase, and uppercase alphabets.
- If we look at the binary code of numbers from 0 to 9, A to O, O to P, a to o, and o to p the last 4 bits are different and the first 4 bits are similar.
- So any number and alphabet can be represented by the last 4 bits and adding either '0' or '1' at the first position.

6 PROPOSED TECHNIQUE …CON.

- To differentiate whether the character is a number, uppercase alphabet or lowercase alphabet control symbols are used, which are the same type as that of number or alphabet.
- For special symbols like !,“ , # , $, %, & , (, ,) , *, + ,‘, - , . , / is also observed and these special symbols can also be embedded in the WAV file.
- When embedding the textual information in any audio file, **first the audio signal is converted into bits.**
- Then the message to be embedded is converted from the above strategy.
- By applying the LSB algorithm, the message is embedded into 16 bits or 8 bits audio sample.

7 PROPOSED TECHNIQUE …CON.

- The performance is evaluated by applying the LSB algorithm at different positions i.e. 1LSB, 2LSB, and so on.
- At the receiver side, the first five bytes are taken, if these bytes are the same as our control symbols bytes then the next character case is defined.

8 PROPOSED TECHNIQUE …CON.

- **Encoding Algorithm and Decoding Algorithm**
  - ***Encoding Algorithm***

1. Input the text to be embedded.
2. Convert the text into 5-bit code by checking the redundancy in binary code of alphabets and numbers.
3. Read the WAV audio file as a cover file.
4. Select an audio sample and hide the converted 5-bit code of the text in a WAV file using the LSB algorithm.
5. Repeat till the whole message can be embedded in audio.

9 PROPOSED TECHNIQUE …CON.

- **Encoding Algorithm and Decoding Algorithm**
  - ***Decoding Algorithm***

1. Read the stego-object i.e. cover audio after encoding.
2. Extract the message by reading the control symbols in samples and reading LSB. Input the text to be embedded.
3. Select all samples and store all LSB position bits in an array.
4. Divide the array into a number of rows and columns
5. Display the secret message.

Thank You