UNIVERSITY OF SCIENCE
ADVANCED PROGRAM IN COMPUTER SCIENCE

Thesis Proposal

Thesis title:

AN APPLICATION OF AUDIO DATA HIDING: RADIO BROADCAST AS A HIGH UTILITY SERVICE

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Type of thesis: Research and Development with demo application

Duration: From 12/15/2015 to 08/15/2016

Contents of thesis:

Introduction

Data hiding is an area in computer science involve principles of modeling, encrypting, hiding information in data files. The scope of this thesis covers handling with audio files, compressed in to MP3 format. We apply the new method of quantization index modulation (QIM) to insert more data into audio files while maintaining the file's completeness against various modification. By that, we propose an implementation to streaming not only sound but also extra information to clients.

Motivation

In recent years, Internet radio has been becoming a new mainstream form of entertainment that attracts a consistent amount of listeners and broadcasters. That domination opens a tremendous opportunity for advertisers to reach an engaged audience. In that context, the advertising over radio channel has been done by inserting an advertising audio fragment into the streaming buffer. However, such a

system lacks a channel that effectively guide listeners to the advertisers intention rather than mere meaningless advertising audio.

Audio watermarking is a technique able to embed information into actual audio content without breaking the sound quality of the host signal. The primary property of audio watermarking is that the embedded data is transparent to perception of human on audio content. We exploit this advantage to devolope a novel system for enhancing the advertising function of radio broadcast services as well as giving supplemental information such music lyrics, weather focast, news, etc. inside the audio data itself.

Goal

An application of audio data hiding to increasing utility for radio broadcast services

Project details

- Learn and implement a method of data hiding for audio that is robust against data compression such as: MP3, MP4, ACC.
- Apply this method to build a client-server application as follows.
  - Streaming server: able to stream audio data with hidden data for a client
  - Audio player: get audio data from server, play them through speakers, and display hidden data or operate certain commands driven by hidden codes.
  - In addition to audio-playing function, this application can retrieve real-time data.
  - Hidden data could be music lyrics, weather forecast, advertisements, other information that users would concern, or command codes for controlling audio player in real-time.

Tools

Matlab - Matlab is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation

Challenges

In this project, we have many areas to research into:

- What we really perceive when hearing sound
- Audio signal processing
- Robust methods of audio data hiding

- How to build a music-streaming server
- How to build an audio player

Besides, our objective includes building a real-time extra data streaming server, to embed whatever information into audio files whenever we want and stream that sound data to users, simultaneously. This is a real challenge that traditional streaming servers cannot deal with.

Research timelines:

Detail	12/15		01/16		02/16		03/16		04/16		05/16		06/16		07/16		08/16	
Topic intro		■																
Research Fourier Transform family			■															
Thesis proposal				■														
Research QIM				■														
Implement an audio player					■	■					■	■						
Setup an streaming server							■	■	■	■								
Implement the hiding module									■	■								
Implement the retrieve module											■	■						
Testing					■	■	■	■	■	■	■	■	■	■	■	■		
Writing													■	■	■	■	■	

Approved by the advisor **Ho Chi Minh city, …/…/…**

Signature of advisor ***Signature(s) of student(s)***