The 1996 Mississippi State University Conference on

Digital Signal Processing

What: EE 4773/6773 Project Presentations
Where: Simrall Auditorium, Mississippi State University
When: December 2, 1996 — 1:00 to 4:00 PM

SUMMARY

The Department of Electrical and Computer Engineering invites you to attend a mini-conference on Digital Signal Processing, being given by students in EE 6773 — Introduction to Digital Signal Processing. Papers will be presented on:

- parallel implementations of fast Fourier transforms;
- real-time audible frequency detection and classification;
- analysis of forestry images for scenic content.

Students will present their semester-long projects at this conference. Each group will give a 12 minute presentation, followed by 18 minutes of discussion. After the talks, each group will be available for a live-input real-time demonstration of their project. These projects account for 50% of their course grade, so critical evaluations of the projects are welcome.

Session Overview

1:00 PM — 1:10 PM: J. Picone, Introduction

1:15 PM — 1:45 PM: Michael Balducci, Ajitha Choudary, and Jon Hamaker, “Comparative Analysis of FFT Algorithms In Sequential and Parallel Form”

This project will provide a comparative analysis of seven FFT algorithms (Quick Fourier Transform, Fast Hartley Transform, Prime Factor algorithm, Decimation-in-Time-Frequency algorithm, Radix-2 algorithm, Radix-4 algorithm, and Split-Radix algorithm). All algorithms will be compared in sequential and parallel form based on computational time and complexity. This task will be accomplished by 1) implementing the FFT algorithms in sequential form, 2)Implementing the FFT algorithms in parallel form, 3) Running a battery of performance tests on each of the implementations and 4) collecting statistical data by which we may compare the algorithms in each of their forms. Using the data collected, we will determine which algorithm is best suited for a given implementation and data set. The information we obtain will have future implications in the areas of image processing, speech processing, radar applications, and most every facet of signal processing.

1:45 PM — 2:15 PM: David Gray, Craig McKnight, and Stephen Wood, “Audible Frequency Detection and Classification”

Current music software relies on external input from MIDI capable devices. The purpose of this project is to develop a software package for music education utilizing an acoustical instrument interface so that players of all instruments can begin to utilize the computing power of today’s world. Musicians who play tones into a microphone will see those tones analyzed in the areas of relative and absolute pitch.

Tone recognition will be accomplished by transforming time domain data into frequency domain data and sifting out the overtones of instruments played into a microphone. The transformation will likely be accomplished using a Fast Fourier Transform (FFT), spectral estimation techniques, or Prony’sp Method. Once the note or notes are identified, the user will be given information about the frequency content of the tones played.

2:15 PM — 2:45 PM: Yaquin Hong, Nirmala Kalidindi, and Liang Zheng, “An Algorithm To Determine The Scenic Quality Of Images“

This project determines the scenic quality of the images.The images are given by the forestry department taken over various seasons and also over different vegetation. The goal will be accomplished by taking into consideration the various factors given by the statistical models. These statistical models were constructed from interviewing various visitors which consisted of people from different walks of life.The statistical models tell us the parameters that are sensitive to visual preference. Some of the parameters to be considered are color, treatment of the ground, size of the trees etc. Also, forest scenery that was undisturbed, containing variety of natural features was preferred.We will attempt to develop an algorithm to extract the various features of the image and analyze the scenic quality.The algorithm determines the scenic quality on a scale of 0 to 1.`1` indicates a high quality image whereas `0` indicates a lower quality one.This project is for the forest department which will be useful to them for the cutting trees as they prefer to cut the forest in such a way so as to preserve the scenic content.

3:00 PM — 4:00 PM: Demonstrations in 434 Simrall