DSP Project Abstracts
ELC 152
October 2010

Project Code:
        ELC152-oct2010-01

Title:
        FFT Analysis of ECG Signals in EDF Format

Proponents:
        Michael Christian Abay
        Juan Wilfredo Ibañez
        Mary Julia Segismundo

Abstract:
This project is a particular application to ECG Signals in EDF(European Data Format). The program reads and extracts data from the EDF. After the extraction of data, a Fast Fourier Transform is performed on the data. There are three algorithms for the Fast Fourier Transform (FFT): 1) a recursive FFT 2) a non-recursive FFT 3) an algorithm for computing direct DFT. All three algorithms are compiled in a library. The results of the three FFT algorithms are compared using a separate program that computes the percentage of the error. The output of the program is in CSV file can be opened using an Open Office.

Notes:

Project Code:
ELC152-oct2010-02

Title:
Audio File Resolution Resizer

Proponents:
Jan Michael Abuzo
Jose Roman D. Arguelles
Francis Ray R. Cruz

Abstract:
The purpose of this project is to analyze audio files. By manipulating and analyzing the audio digital sample's bit depth it will be possible to gain statistical data from modifying sample data. The statistical data will provide for a measure of the converted data in comparison to the original data The data is related to understanding the properties of compressing data. It will also determine what bit depths are capable of producing reasonable audio quality.

Notes:

Project Code:
    ELC152-oct2010-03

Title:
    Image Cropping Application

Proponents:
    John Vincent Lloyd O. Bermudez
    Lester T. Lim

Abstract:
The Image Cropping Application is a cropping application that has the capability of cropping images at an angle. The program is written in C++ and compiled using wxDevC++ in order to employ a reliable GUI. Multiple document interface (MDI) was used in its user interface to be able to handle and view multiple images in the same main frame. The program is able to load, crop at an angle, and save images in BMP, JPG, and PNG formats.

Notes:

Project Code:
ELC152-oct2010-04

Title:
LTI System Class

Proponents:
Anna Charina R. Cabatuando
Gerald Gracius Y. Pascua
Andruen E. Sanico

Abstract:
This project is a C++ implemented Linear Time Invariant System Class. Given an input file containing the filter coefficients and a sample sinusoidal wave input, the user can select a preset filter effect to perform. The program is also capable of generating other filter effects by performing addition, multiplication and scaling operations on the preset filters. Two filter applications were created. The first, a filter tester application, used to test the filter by manual input of parameters and selection of an input filter file. The second, a filter operation application, allows the user to add or multiply filters to create a new filter. Output sinusoidal waves and filter coefficients are saved in a .txt file. The user may verify the resulting filtered sinusoid by graphing the samples in a Microsoft Excel spreadsheet.

Notes:

Project Code:
> ELC152-oct2010-05

Title:
> Graphical Audio Waveform Display

Proponents:
> Hannah Katrina B. Cariño
> Ma. Kassandra D. Salvacion

Abstract:
This project implements a waveform display for an audio file using wxDev-C++.

An audio file can be loaded to the program, where it validates, reads, and obtains relevant information from the chunks in the WAV file according to the RIFF structure. To keep things simple, the program deals only with uncompressed PCM (compression code 0) WAV files, but deals with both audio and stereo files. Data from the data chunk are loaded into two dynamic arrays or vectors, which plot the points with the help of koolplot, an open source graphing library. A waveform across the time domain is produced and displayed separately for each audio file loaded.

The program has not fully developed the graphic user interface of the input stream of the loaded file, however, the group succeeded in creating a program that allows multiple window display for the audio files loaded.

Notes:

Project Code:
> ELC152-oct2010-06

Title:
> Flexible Audio Player

Proponents:
> Jason Franco S. Conanan
> Miguel Emmanuel D.J. Suarez
> Nico Angelo F. Villarica

Abstract:
A console-based flexible audio player is implemented using C++. Along with this is the design and implementation of an audio class that contains functions for playback, reverse playback, and pause and resume. The flexible audio player is capable of playing 8-bit, 16-bit, 24-bit, or 32-bit single- and dual-channel WAV audio, with sampling rates of up to 44.1 kHz.

Notes:

Project Code:
ELC152-oct2010-07

Title:
3D Histogram Display

Proponents:
Karl B. Coresis
Jose Michael E. Del Rosario
Adremel Philip H. Redondo

Abstract:
A 3D histogram display is implemented in this project. The 3D histogram displays a frequency distribution of RGB values present in an image. The axes of the 3D histogram are red, green and blue and each RGB value is represented by a cube that has a color matching with the RGB value. The frequency of the RGB value is shown through the opacity of the cube. The histogram and the view can be rotated and zoomed to see the histogram from all directions using the assigned keyboard keys. The color of the background and the number of gridlines can also be changed using the assigned keyboard keys. In addition to the display, a text file containing the RGB values and its corresponding number of pixels in the image is generated for analysis.

The program uses Bloodshed Dev-C++ with additional libraries such as openCV and openGL to simplify the implementation of the 3D histogram. The program is tested and is able to display the 3D histogram of the image and generate the text file. The program is only applicable to images with jpeg, png and bmp format.

Notes:

Project Code:
ELC152-oct2010-08

Title:
Image Resizer Using Bicubic Interpolation

Proponents:
Isadelle Mara de Guzman
Elaine Valerie Ramos
Jose Paolo Talusan

Abstract:
An image scaler is implemented using the C++ language. The images were scaled using the method of bicubic interpolation. Included in the project is a graphic user interface (GUI), in which both the input image and the rescaled output image can be viewed. Image types such as BMP, JPG, PNG, and GIF can be opened and scaled in the project. Furthermore, multiple images can be loaded and rescaled in the same GUI. The images can then be saved in the form of BMP files, JPG files, or PNG files.

Notes:

Project Code:
ELC152-oct2010-09

Title:
Image Filter Class

Proponents:
Ronna May B. Dimapilis
Carmina E. Reyes
Janine Lizbeth C. Rugayan

Abstract:
ImageFilter is a C++ class developed using wxDevC++ compiler and the wxWidgets library. The ImageFilter class represents linear image filtering by matrix convolution.

The Image Filter Application (IFA) is a graphical user interface developed using wxDevC++ compiler and the wxWidgets library. It is capable of loading multiple images of any file format, filtering any of the loaded images, and saving in any image file format. It features three ways of setting a kernel: use the default values, load a .txt file, or customize using the wxGrid. The IFA also features one non-linear filtering process, which is the median filter.

Notes:

Project Code:
    ELC152-oct2010-10

Title:
    ADPCM Measurements

Proponents:
    Ace John Dimasuhid
    Joseph Andrew Mercado

Abstract:
This project is a C++ implementation of a ADPCM measurements that takes the
difference of a wav file to a file that had undergone Adaptive Differential Pulse Code
Modulation (ADPCM) compression and decompression. The program will get a wav file
and will compressed it to ADPCM. It will then decode it back to playable encoding. The
two files will then be compared by taking the difference per sample.

Notes:

Project Code:
ELC152-oct2010-11

Title:
Automated Image Stitching

Proponents:
Mara Karmela Q. Duterte
Via Francesca L. Mateo
Rachel Anne D. Nayve

Abstract:
*i*Stitch is an image processing application that works by uploading two images with overlapping regions to be stitched together as one image. Users are given the option to indicate the size (in pixels) of eight boxes located at the edges of the first image. These regions are then compared to the second image via a cross correlation algorithm. Cross-correlation measures the similarity of the pixels between two images. The normalized cross-correlation coefficient may range from a value of -1 to 1, where 1 denotes a perfect similarity. This application gives an output of a stitched image which is created using the stored pixel values of the images.

To be able to create a user-friendly application, the programming software wxDevC++ was used. This software provides tools and functions for creating graphical user interfaces and is capable of handling image formats such as BMP, GIF, JPEG, TIFF and PNG. Thus, users can easily navigate and follow the intuitive interface of the application. As an additional feature of the application, users can also stitch two images of different formats. Help files and user-guide documents are also provided for a more user-friendly and interactive application.

Notes:

Project Code:
ELC152-oct2010-12

Title:
Image Resolution Manipulation

Proponents:
Juan Paolo G. Fernando
Ryan Jay P. Ferrera
Francis Jerome G. Tiausas

Abstract:
The higher the resolution of an image, the more detail it has. A single pixel is created by combining different values of the three color channels in the RGB color model, with each different combination resulting in a specific pixel color. Implemented with the use of wxDevC++, this project can open an image file of 8-bit resolution, change its resolution by altering the bit count for the three colors (RGB), and produce the edited image. The *Bitmap* and *Image* classes were used in order to design and implement the resolution functions, and a graphical user interface which illustrates the difference between the original and the processed image is also supported by the program.

Notes:

Project Code:
> ELC152-oct2010-13

Title:
> Image Morphology

Proponents:
> Rollyn T. Labuguen
> Jens Jaron C. Velarde
> Edsel Jose P. Volante

Abstract:
This project deals with the processing of images specifically image morphology. Two of the basic morphological transformations, erosion and dilation are used in the program as well as the different combinations of both transformations. Morphological image processing is used for extracting image components that are useful in representing and describing region shapes. These techniques are usually used to remove the imperfections or noise in the resulting image introduced during the image segmentation and they typically operate on binary images. For this project, the group would create a program using wxDev-C++ that would apply these morphological transformations on an image file given by the user.

Notes:

Project Code:
    ELC152-oct2010-14

Title:
    Audio Frequency Analyzer

Proponents:
    Gerrald Carlo A. Mateo
    Zarah Katrina E. Pulmano
    Maria Mae Fleur M. Villanueva

Abstract:
An Audio Frequency Analyzer that displays an audio sample in the frequency spectrum is implemented using C++. First, it is programmed to record 16-bit audio samples with a sampling rate of 8 kHz. Another class is created to provide functions that get the Discrete Fourier Transform (DFT) of the audio samples. Finally, a graphical user interface is developed to display the frequency spectrum obtained from the DFT computations. Note that the recording and graphing of the frequency spectrum is done continuously and by blocks, where each audio block consists of 1024 samples.

Notes:

Project Code:
   ELC152-oct2010-15

Title:
   Audio Class

Proponents:
   Carl Jason G. Rullan
   Robert Eli T. Varilla

Abstract:
The development and implementation of an audio class with functions made for WAV files in C++ using windows libraries are aimed for this project. Through this class, the user would be able to use the following primary functions: Load, Play, Record and Save. This class would allow the user to handle audio files easier.
In order to access a specific music file, accessing the computer's sound card is the most important. The sound card or audio card is a computer expansion card which controls and processes the audio signals that are inputted to and outputted from the computer. In this project, since the sound file comes from within the computer memory, this audio is simply loaded into a temporary buffer memory and then converted from digital audio samples to an analog signal to be outputted to the speakers.

Notes: