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Link to Resumé

Brief Background

I am an Undergraduate Student in Computer and Communication Engineering. Currently in my pre-final year, I have done diverse range of projects varying from Computer Systems, graphics, Image Processing and Learning. (details are in my Resume)

I am good in Academics with current CPI of 9.16/10.

Project Information

Project Title

Consolidating and Adding the Image Processing tools to LIBICV

Brief summary of Project

BRL-CAD has a number of image processing tools. Currently all the tools are implemented in a modular fashion where in each tool is accessed as a module. The primitive task of this project is to combine the image processing tools to a library and advanced element of this project is to add additional relevant functions from cxImage library to the BRL-CAD's image processing library (LIBICV).

This task will ensure the reusability of these tools by the application programmer through relevant api calls in the code and thus will be useful for building a proper GUI for BRL-CAD and helpful in other new tools/functions to be added to BRL-CAD in future.

Project Description (Detailed)

This project aims at consolidating the Image Processing Tool (IPT) (around 100 in number) under a library (already initiated as LIBICV in BRL-CAD). Additionally this project will add few elements from

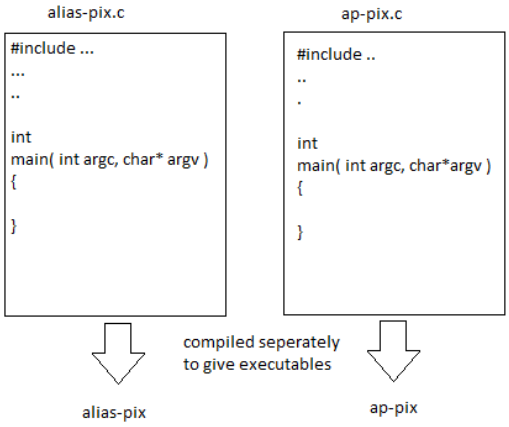
the cxImage library dealing with dsp, filters etc. and adding additional formats of images to read and write. Details of which are given in section A.

BRL-CAD's IPT(s) Information and Current Status

BRL-CAD's IPT(s) are extensively written for various Image Processing task. Apart from the other formats it has support for the BRL-CAD pioneered .pix format and the unix plots. Thus BRL-CAD cannot use any other third party library for Image Processing without altering them. Therefore work is underway in strengthening and Consolidating BRL-CAD's image Processing Library.

Currently these tools are implemented as standalone applications where in each tool is a separate program and separate executable are compiled through these programs. To run any tool, currently we pass command line arguments to the executable file (separate for each tool) and the return arguments are received on standard output buffers or it could be done by saving the output at some location.

The following figure explains the above non-modular methodology.



Consolidating IPT(s) under LIBICV

This is the primary task of this project wherein the current tools are to be arranged and consolidated to a library lib_icv. It is possible to create our own library of function by writing the current function as subroutines. Any api caller just needs to include the said library and thus has access to the current modules which will be declared as functions in that library.

Libaries consist of a set of related functions to perform a common task. In our case we have set of modules/tools (in src/util) which are compiled separately. We can compile write our tools in modules (each containing one or more current tools) and compile (into objects) them individually to link that to a shared library. This could be done very easily using the make in unix which helps resolving dependencies and compile modules and linking them to shared library.

Among the current tools groups will be identified which could enhance the usability of the tools. Proper Documentation will be done as discussed in later sections.

Addition of library function from cxImage

{Introduction about cxImage}

CxImage is a C++ image processing library that can load, save, display, transform images in a very simple and fast way. CxImage is open source and licensed under the zlib license.

This library implements various image processing algorithms which are not the part of the current utilities. As per the current digging of the source code of the utilities, I propose to add three modules of CxImage which are Basic Transformations, Transformations and DSP. (Although things will be discussed with the mentors about usability of other modules in BRLCAD's prospects) These will provide added features and will be added advantages for utilising functions calls.

{Using the cxImage Library Function}

To make this library useful with the current libICV, I propose to write a bridge functions to convert between the two formats (icv_image_file structure<- > cxImage class). These functions may look like this

icv_image_file* cvt_cxImage2icv(cxImage)

cxImage * cvt_icv2cxImage(icv_image_file*)

Documentation

Currently brlcad has man pages for all the tools in the utilities. I propose to change these man pages with the manuals of the functions implemented. This can be done with the sync of converting each function to the library function.

Besides this since this will turn out to be a library which could be used as a third party library by users belonging to other fraternity therefore, I propose to create a complete documentation of all the functions parameters they take etc.

- **Links to any code or algorithms you intend to use**

http://www.cs.dartmouth.edu/~campbell/cs50/buildlib.html

- **Deliverables (specific, measurable goals)**
- **Development schedule**
  - **List at least three milestones**
- **Describe time availability (40+ hours/week assumed)**
  - **List any known commitments (e.g., exams, vacation)**

Why BRL-CAD?

In my final year at the university, I am due to work on my Under Graduate thesis. As per my background, my university has assigned me a faculty dealing in graphics and Image Processing.

This motivates me to utilise my summer holidays working with BRLCAD due to their large codebase dealing with Image Processing and Graphics and thus becoming a regular contributor with it in my final year which would help me to complete my thesis.

Why you?

I am good in c, c++. I will not say that I possess excellent coding skills. But I have enough to work on this project. Besides this I am dedicated and have an inquisitiveness to learn new things.

Anything else?

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