

# COMS W4115 PLT

Spring 2014

## Project Proposal

### ImageVis (IV)

#### Image Visualization Language

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#### Introduction / Motivation

The growth of visual content on the web has created many repositories of visual images available to the user. Accounts with services such as Flickr and Pinterest allow users to create repositories of visual content to share with others on the web, however presentation of the sets of images is often limited in format. The motivation behind ImageVis (IV) is to enable the user to create 2-dimensional visualizations of the image sets which provide more meaningful insight into the data and metadata associated with the pictures. With IV, the user will be able to create visualizations of the image sets in thumbnail format based on relationships between the images. Types of plots that can be created include Cartesian, Polar, Row List, Column List, Vertical Histogram and Horizontal Histogram. The parameters to use for any of these types of plots can include the image name or date (metadata), as well as visual properties such as color or texture similarity. This may allow patterns in the metadata or visual content to be discovered, as well as the identification of clusters and outliers. The many possible combinations of parameters for the supported plot types will allow the user to create several visualizations leading to the discovery of relationships among the images.

#### Key Features

- Import of image files.
- Conversion of images to thumbnail representations (sizing).
- Computation of color similarity between pairs of images.
- Computation of texture similarity between pairs of images.
- Creation of ordered lists for image metadata or visual properties.
- Visualization in Cartesian Plot format with arbitrary X and Y parameters.
- Visualization in Polar Plot format with Radius and Angle parameters.
- Visualization in Rows (List) with single parameter.
- Visualization in Columns (List) with single parameter.
- Definition of histogram group ranges.
- Visualization in Horizontal Histogram format with single parameter.
- Visualization in Vertical Histogram format with single parameter.

## Language Description

The ImageVis language will mostly contain C-style statements with additional commands specific to the image feature computation, plot parameter selection and plot display.

### Data Types

Integer, Float - numeric data types

Bool - logical data type

String - for image names

### Composite Data Types

Array - for lists of metadata or image feature values

Pixel - for algorithms to compute color or texture features and similarity

Image - to hold image data in full or thumbnail format

ColorHistogram - for image color features

TextureHistogram - for image texture features

Panel - for plot display

### Iteration

For (loop)

While (loop)

### Conditionals

If, Else

Continue, Break

### Operators

+ - / \* - for arithmetic operation on numeric data types

= - for assignment

== != - for equality or inequality for numeric data types

### Functions

ConvertToThumbnail(A) - to create a thumbnail version of an image

CompareImageColor(A, B) - to compare color similarity of two images

CompareImageTexture(A, B) - to compare texture similarity of two images

SetCartesianParam(X, Y) - to set parameters (axis) for Cartesian Plot (x, y coordinates)

SetPolarParam(R, A) - to set parameters for Polar Plot (radius and angle coordinates)

SetRowListParam(P) - to set Row Plot (List) parameter

SetColumnListParam(P) - to set Column Plot (List) parameter

SetHHistParam(P, N) - to set Horizontal Histogram parameter, number of groups

SetVHistParam(P, N) - to set Vertical Histogram parameter, number of groups

SetPlotType(T) - to set the type of plot to create / display

DisplayPlot() - to display the plot