PHP-based Image Recognition and Retrieval of Late 18th Century Artwork

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Handouts are available for students writing summaries for class assignments
Content Based Image Recognition

- The automatic process of retrieving specific images from a collection by low-level features
  - Features include color, shape, and texture
  - Features are obtained automatically from the images
    - No human annotation
Project Goals

- Create a simple, practical application of content-based image recognition
  - Keep the project realistic
  - Trade some accuracy and technique for speed and simplicity
    - Color matching
    - Query by example
  - Reduce number of images from ~62,000 to a more manageable 2 - 6 dozen to look through
Project Goals (con’t)

- Create a system to index, search for and identify unknown pieces of artwork
  - Limit artwork to late 18th century European art
    - Provide a large collection of readily available images
    - Limit the image domain to a specific, realistic application.
  - Inspired by Dr. Veltman’s ART 210 art identification quizzes
Process

- Automatically index images and their relevant information
- Create a form to upload an unknown image to identify
  - Check user input
  - Provide options to tweak the image comparison
- Search through images in the database
- Display results for the user to compare
Implementation

- **Search Engine**
  - Written in PERL
  - Indexes new artwork from online art galleries
  - Saves a copy of the image locally
  - Stores image information (artist name, title) in a database

- **Database**
  - Type: MySQL
  - Stores image title, local and remote paths, and artist’s name
Implementation (con’t)

- Search algorithm
  - Written in PHP
    - GD Image libraries
    - Plentiful resources on image manipulation
  - Samples 5 regions in the image
    - 4 corners and middle
    - Quick approximation of the image
  - Creates color histograms and compares the top 10 most common colors
    - Speed and simplicity over total accuracy
Login Status: Please provide ALL information

Username: 
Password: 

Captcha Code: 
AwXvVoxjcQ ClXykoqNVGR 7B2iMhxm11w 4gQEBi2LqV 0xBYwP6a1k K0PrJW5bqa
Enter the yellow code

NOTE:
"0" is a zero and "l" is a one
All codes are cASe SEnSItive

Login
Image Upload

Image Upload

Image: C:\Documents and Setti

Please upload a jpeg image before you start
Upload Image
Search Options

**Pixel Color Variation:** 150
How much variation in the RGB values of the pixels is allowed (0-255)

**Test Region Variation:** 9
How many of the top 10 colours need to be the same (1-10)

[Search]
Search Results

Original Image

Original Dimensions: 180 x 131
Scaled Dimensions: 180 x 131

Possible Match

Title: The Necklace
Artist: A Buzzi
Search Weakness

Original Image

Original Dimensions: 180 x 135
Scaled Dimensions: 180 x 135

Possible Match

Title: Feeding Time
Artist: Filippo Palizzi

Possible Match

Title: Sacrifice of Isaac
Artist: Jacopo Ligozzi
Search Weaknesses (con’t)

- Solely color based
  - Gray scale images will not return results
  - Significantly lighter or darker query images will not return accurate results
  - Scaled images lose color information

- Sample location
  - Cropped or oddly sized images may not be sampled consistently
Improvements

- **Normalization of image lightness**
  - Convert image to HSV color space to correct differences in lightness

- **Edge detection**
  - Supplement the color histograms

- **Gray scale support**
  - Detect gray scale images and convert the images in the database

- **Caching of image histograms**
  - Increase the speed of future searches