Project 3: Content-Based Image Retrieval Due March 16

Overview

- Segment images into regions using color clustering, connected components, and some kind noise cleaning and small region removal.

- Compute features for each region to be used in matching.

- Construct a description of each image in terms of its regions and their attributes.

- Design a distance measure that computes the distance between 2 images.

- Create a query system that compares any query image to 40 database images and returns their ordering according to the distance measure.

- Test your system on the 8 query images we specify.

- Report your results.

Segmentation

- First use color clustering in color space of your choice.

- Apply connected components to get a labeled image whose labels are region numbers: 1, 2, 3, …up to 255.

- Clean up the result, remove small regions, holes in regions, etc.

Attribute Computation

- region size

- mean color vector

- texture attributes from one of the common texture measures such as LBP, co-occurence, edgness per unit area, edge magnitude and/or direction histogram

- centroid

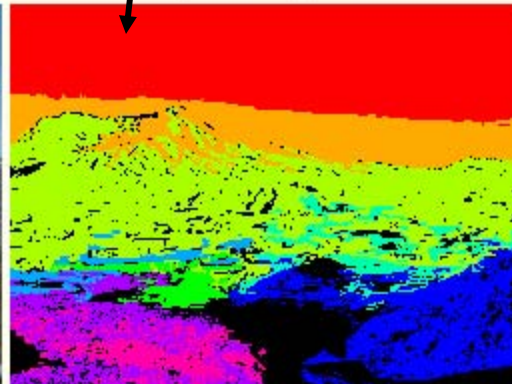- bounding box or other representation of the extent of the region, such as ellipse

Distance Measure
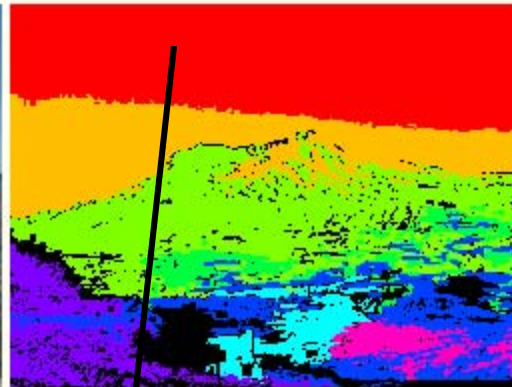
mountain image   segmented by color
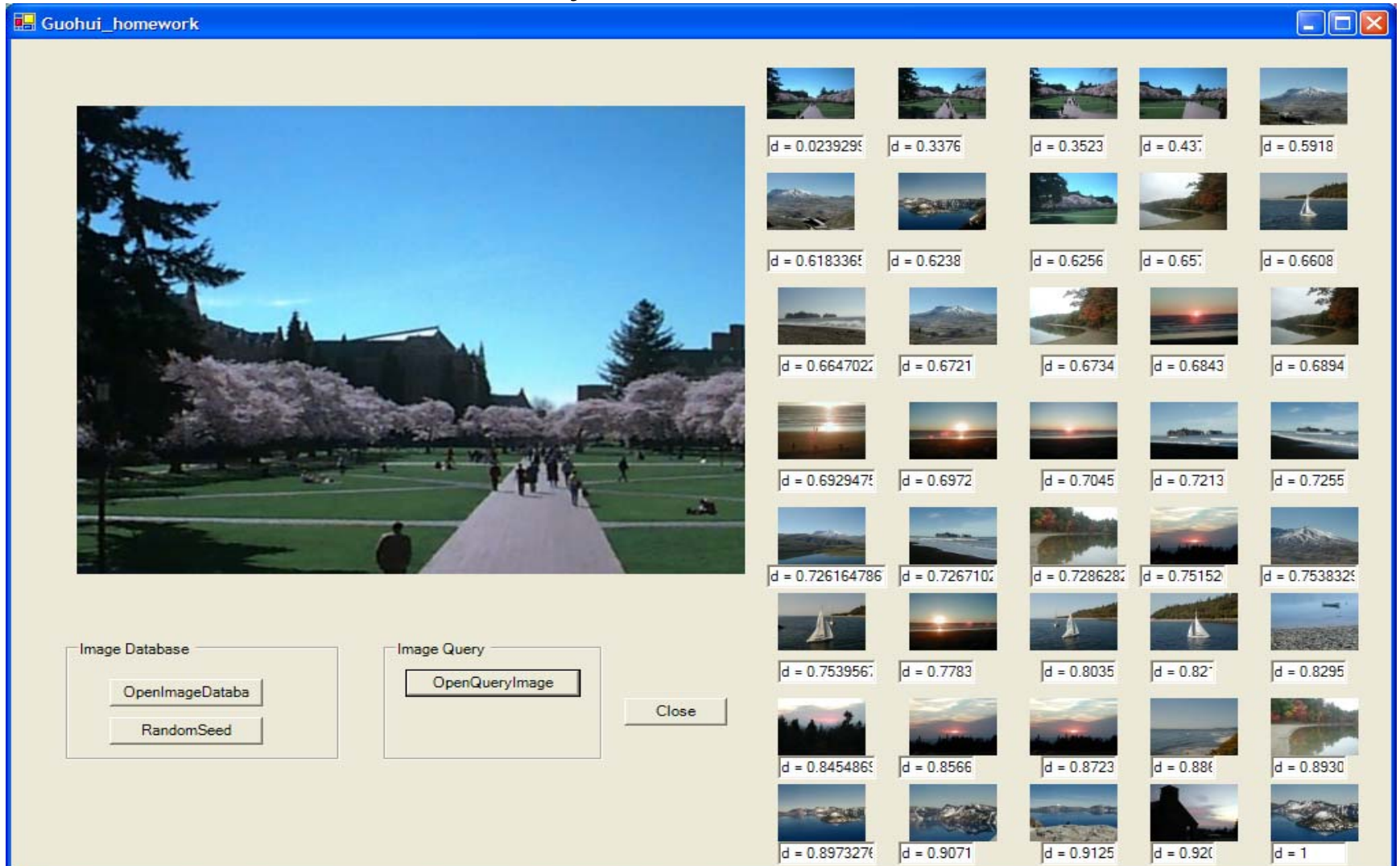
Define a region distance.

Then find the best corre-spondences between regions of the first image and those of the second.

Define your image pair distance based on the distances between corresponding regions.

For extra credit, add spatial relationships.

Query System
Create a query system to test your ideas.
The fancy GUI is extra credit.

Test Your System

- Test your system as indicated below.
- The database has 40 ppm images for the tests.
- The following images should also be query images.
  - beach_2
  - boat_5
  - cherry_3
  - crater_3
  - pond_2
  - stHelens_2
  - sunset1_2
  - sunset2_2
- Use your distance measure to compare each query image to all 40 database images, recording the distances you get for all 3

Report

- Introduction: describe your system and overall framework.

- Describe your region finding algorithm. Give several examples to show your color clustering results and improved regions.

- List the attributes you selected to describe the regions. Explain why you want to use them.

- Describe your region correspondence algorithm.

- Describe your distance measure a and explain the motivation.

- Show the results of your tests of the 8 query images (and anything else you want to show).

- Discuss your results. How well did it work? What went wrong? What might improve the system?

Sample Timeline

- First week: region finding (color clustering, connected components and post-processing)

- Second week: Compute region attributes and data structure

- Third week: Develop distance measure and query system.

- Fourth week: Finish testing and write it up.