Autonomous Tour Guide

Team 6
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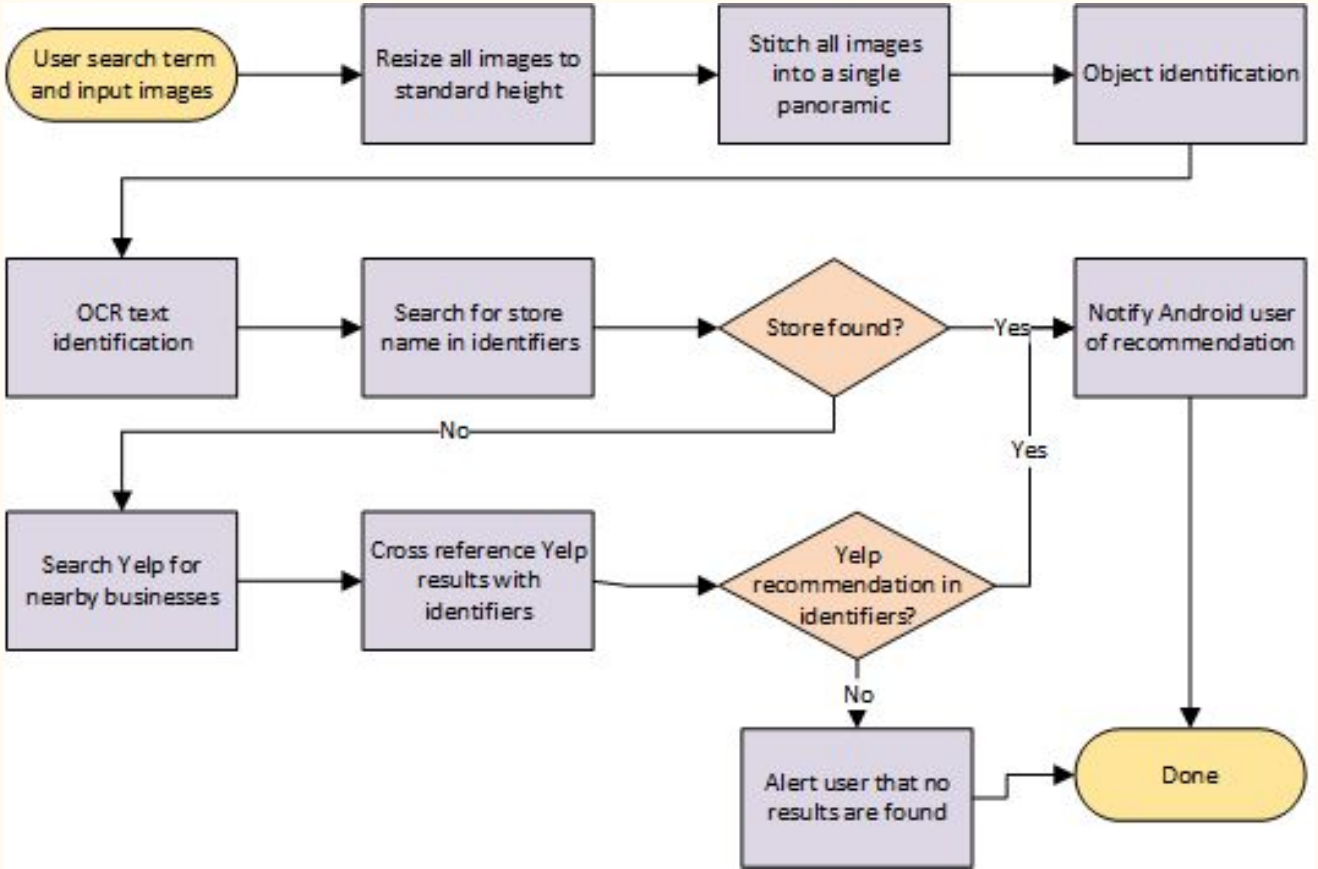
https://github.com/smoeller1/BigData-Spring2016-TourGuide

Server HLD


User search term and input images
Resize all images to standard height
Stitch all images into a single panoramic
Object identification
OCR text identification
Search for store name in identifiers
Store found?
Yes
Notify Android user of recommendation
No
Yes
Search Yelp for nearby businesses
Cross reference Yelp results with identifiers
Yelp recommendation in identifiers?
No
Alert user that no results are found
Done

Stitch

1. Run a SURF detection against this image and previous
2. Generate a similarity score between the features in the two images uses Euclidian distance
3. Use a RANSAC algorithm to identify the best matched features to use to stitch the images
4. Create a new image of size 2*(previous image size), and draw the matched, stitched image

Input Data:

First iteration - all image files found in the input directory

All iterations after first - an ArrayList of all sub-panoramic images from the previous iteration is passed

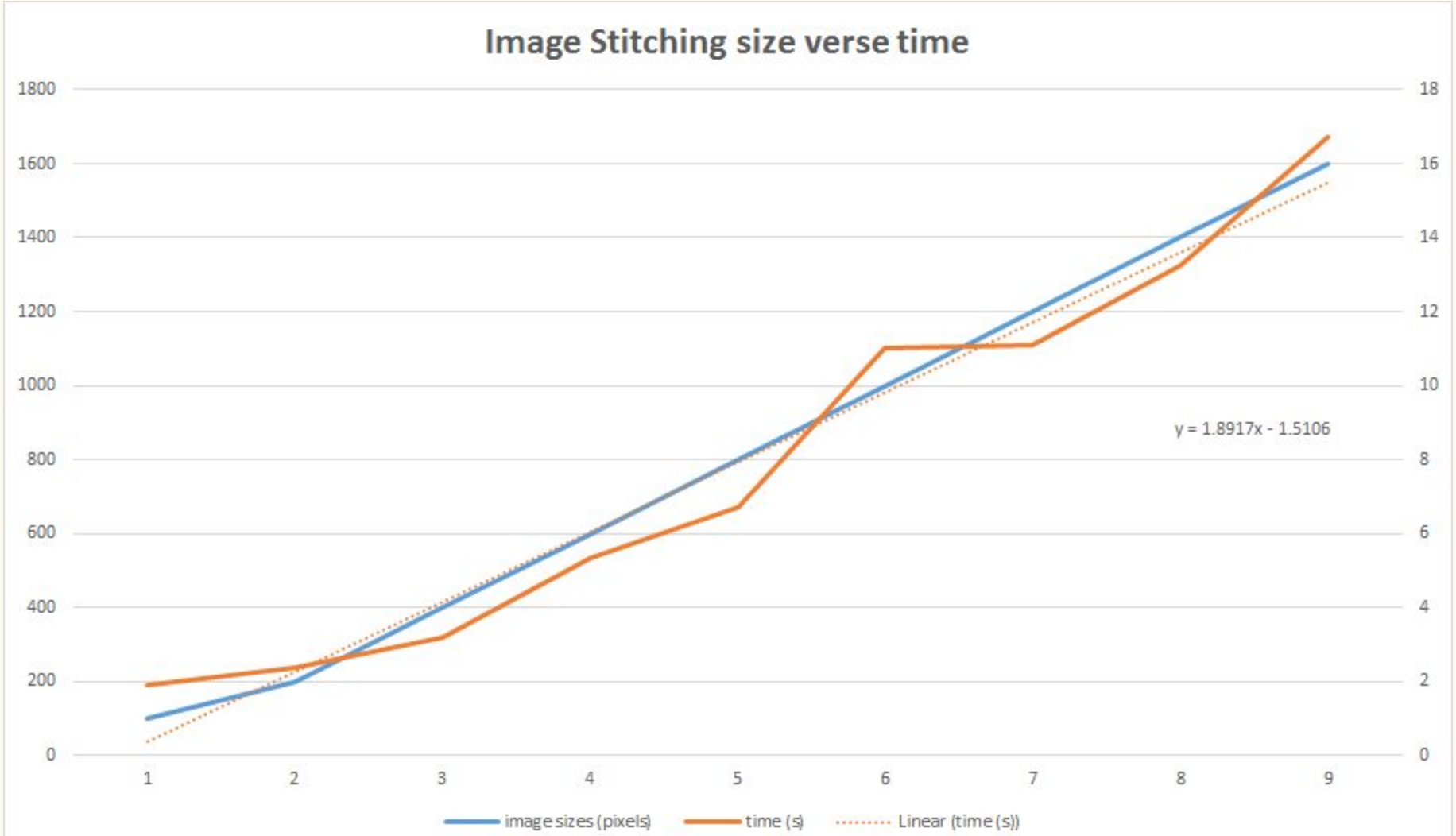


Image Stitching size verse time
1800
1600
1400
1200
1000
800
600
400
200
0
18
16
14
12
10
8
6
4
2
0
1
2
3
4
5
6
7
8
9
y = 1.8917x - 1.5106
image sizes (pixels)
time (s)
Linear (time (s))

IdentifyImage

1. ORB is used for feature detection, due to performance (2 orders of magnitude faster than SIFT with similar quality of results)*
2. The normalized correlation coefficient method is used for matching the objects in the images
3. Random Forest model used for training

Data:

Training/testing data: Static, labeled training data set collected from Google searches

Using two categories, Exits and Bathrooms, with 32 images, achieved an image detection accuracy of 87.5%

Image OCR

Utilizes the tess4j Tesseract libraries

Tesseract libraries provide optical character recognition for whole images (as utilized here), or for subsections of images

Data:

Training data: static data collected from the tess4j SourceForge site

Testing against 33 images:

- 9.1% successfully read entire keyword
- 27.3% successfully read part of keyword

Credits

This work was done in partial fulfillment of the requirements of CS5542: Big Data Analytics and Apps, CSEE Department, University of Missouri–Kansas City (Spring 2016). Instructor: Dr. Yugyung Lee, TAs: Mayanka Chandrashekar, Feichen Shen.