Text to Image Translation for Restaurant Menus
Michelle Jin, Ling Xiao Wang, Boyang Zhang
Department of Electrical Engineering, Stanford University

Motivation
A common problem encountered when reading restaurant menus is the lack of visual representation. Furthermore, ethnic foods may have non-standard English translation, making visual representation even more desirable. We propose a project that will recognize entrée names in Chinese and returns the corresponding image.

Menu Item Detection Setup
Phone sends photo of menu item to server for processing

Preprocessor
Menu acquisition and item segmentation

Image Processing Pipeline
Link each item to unique visual representation
Calculate SIFT and vocab tree histogram
Store to database

Real Time
Image acquisition
Resize and binarize image
Rotate image and detect central text box
Calculate SIFT and vocab tree histogram

Transmit Image
Load corresponding entrée image
Find best 2 stage SIFT match with database entries

2 Stage SIFT Match
Stage 1: Course estimate by comparing feature histogram from vocabulary tree binning.
Stage 2: Fine estimate by applying RANSAC between test image and the database image from the top 5 images from the course estimate.

Menu Database Schema
For Each Item in the Menu
Link to entrée picture
SIFT Descriptors

Original Menu

For Each Item in the Menu
Link to entrée image
SIFT Descriptors

17.葱油饼
17.葱油饼

Vocabulary Tree Histogram

Sources of Error
1. Incorrect binarization of image is responsible for the majority of error.
2. Hough transform error highly dependent on binarization parameter. Even slight differences in binarization can induce shifts of up of 45 degrees or more by the hough transform.
3. Box detection may fail if lines are broken into smaller non-contiguous lines due to binarization.
4. If the vocabulary tree ranks the correct image within the top five matches, RANSAC will find the correct affine transformation.
5. Macro shot not necessarily better because extra lines helps alignment.

10X Sift Match Speedup
2X Overall Speedup