# Image Retrieval System

## Overview

The system is to build a search engine that is capable of search any given images. The tools we used in order to implement our designs include Apache LUCENE (text based search engine) and Fast Library for Approximate Nearest Neighbors (FLANN, build cluster centers and find neighbors). The core design of this system is to use the key points extracted from the image and build the necessary indexes.

## Project Files Description

Main.cpp
The executable program compiled from this file will first go through all the feature files (bag-of-words of key-points from all images in the database) and build cluster centers of them. And then utilize the cluster centers we then build indexes and find nearest neighbors for all them images. We then output all the nearest neighbors to a designated format that can be recognized and utilized by LUCENE.

Build-new.cpp
This file will be able to retrieve the necessary search criteria for images that are not yet in the database. It first loads the cluster centers that were built by main.cpp into memory, and it then calculate the index and nearest neighbors based on the existed cluster centers. Thus, it could be matched into similar images that are already in the database.

IndexTREC.java
This java program reads the trec files generated by main.cpp and build them into LUCENE index files that can be readable by LUCENE search/retrieve libraries.

Search.java & SearchBuilder.java
These two files are the interfaces for GUI programs to search using LUCENE. It preloads all the necessary data/indexes, thus the search process will be instant available since all the time-consuming procedures are to read databases.

Main.java
This file will run all algorithm and GUI interfaces.

## Preparation

Copy lucene-4.6.0 folder into the project folder
Copy flann folder into the project folder

Copy siftWin32.exe into the project folder

## Program Usage

1. Add necessary LUCENE library files to java project.
2. Run Makefile[1].
3. 

*build-trec esp.feature esp.size imglist.txt esp.trec*

4. Start a new java project and import all java files.
5. Modify IndexTREC.java and edit *indexPath* and *docsPath* to corresponding locations and run.IndexTREC.java
6. Modify ViewerSerive.java and edit *index_* and *trec* to corresponding locations and run Main.java
7. Search images that already in the database:
   Select Files->Open; Select Tools->Image in database
8. Search images that not yet in the database;
   Select Files->Open external PGM File; Select Tools->Image out of database

1 This will only build under windows. File generated by SIFT have different format styles under different Operating Systems.