

CSE 190A
Biometrics
Fall 2006

PROJECT

The project for CSE190a is one of the most important and exciting components of the course since you will have the opportunity to construct a pattern or object recognition system of your own choosing. I will offer lot of latitude in selecting a project, and it can be tied into thesis or other research. However, it must be distinct from the main line of your research. That is, it must be something that you probably wouldn't have done unless you were taking this class.

The emphasis of your project should either be: 1) To implement a solution to a particular biometric application, or 2) To implement and test a particular biometrics technique that is not presented in class. In either case, the project should not be solely theoretical in nature, but should have a strong empirical component. You may work in pairs, but I expect more from a pair than form an individual, and in your proposal, you should describe the primary roles of each person.

There are four important deadlines for the project:

Oct. 10: One page description of topic and goals

Nov. 2: Literature review and full proposal

Nov. 30: Project presentations

Dec. 1: Final Report

The one page description should present the goals of your project, and perhaps some initial thoughts on how you might address it. If you are going to need particular experimental resources (e.g. digitizer, camera, an image database, etc.), you should mention it here. Once you pick a topic, I expect that you will stick to that topic unless you've consulted with me, and written another project description.

For the literature review/proposal, which counts for 20% of the course grade, you should try to do a complete literature search on the specific application to learn how others have solved the problem. You should also read about the specific techniques that you propose to use to solve the problem. I expect that you will skim about 12-15 articles and know the main ideas. You will probably have to read about 5-6 papers very closely. Your review should reflect this effort. It should also show the connections between the different papers and how they relate (i.e., the review should not just be six abstracts). The literature review should be 6-10 pages, and an updated version should be included in your final report. This report should also include an expanded project proposal which

elaborates on your original one page project description. That is, based on your research review, you may have expanded, scaled back, or altered the scope of your research. Also, by this point, you should know what algorithms/techniques/features you intend to implement, and should describe them here.

When implementing your project, you can use any language that you like. In the past, students have been particularly successful using Matlab. Note that the main point is to prototype one or more solutions, and not necessarily to write the fastest code. Similarly, I do not want you to be implementing commonly available routines (e.g. matrix inversion, SVD). You should use "off the shelf" components as much as possible so that you can tackle the interesting parts of the problem, and not get bogged down reimplementing what has already been done.

The final report should be handed in either to Prof. Kriegman's office (EBU3B 4120) or his mailbox on the second floor of EBU3b by the due date. The report should be written in the format of a conference or journal paper, so take a look at the structure of the papers that you read for the literature review. Your final report should include an updated literature review since you may have read additional relevant papers. The report should also describe the solution to your chosen problem and should present the results of experimentation. I will look particularly favorably on experiments that really characterize the performance of the system and go beyond simply demonstrating that it worked on one example/data set. That is, you should try to "push" your system to the breaking points. Finally, there should be a discussion section where you candidly evaluate the system. In particular, you should discuss the limitations of the approach, and present ideas of what you would have liked to try if only you had two more weeks to continue working on the project. What would you try if you had two more months? The final presentations will be about 10-15 minutes.

Suggested Topics

Below is a list of some topics that you might consider for projects. This is not an exclusive list, but is meant to motivate your thinking. If you'd like to meet with me before submitting the one page project description, send me e-mail at kriegman@ucsd.edu with times you are available to meet.

1. The Biometric Soda Machine – You read about it on Slashdot, the UCSD CSE web page or saw it on the news. You too can be part of Soda Vision. As the world's first biometrics-based soda machine, you can contribute to Soda Vision and get credit for CSE190. Add a new biometric or improve an existing one, or merge the decision using multiple biometrics.
2. Visual screen savers: Most computers have a screen saver that dims the screen if a key hasn't been pressed for some period. Using a camera mounted above a screen, determine if a person is looking at the screen.

3. Implement recognition using a specific biometric where evaluation databases already exist. (e.g., face, fingerprint, iris).
4. Implement a recognition/verification system using hand geometry using a web cam.
5. Develop methods for performing fingerprint recognition using minutae which scale to very large databases (focus on data structures allowing fast indexing).