

Video Attendance

CS 101

Autumn 2014

Project Report Stage 2

Group 2

Keshav Srinivasan	140260001
Kshitij Bajaj	140100116
Kumar Ayush	140260016
Reebhu Bhattacharya	140260011

Planned Project Timeline



Real Project Timeline

2 persons, 1 week
studying algorithms
and mathematics
involved in HMM

4 persons, 1 week
end semester
examination

4 persons, 1 week,
2 persons on GUI
and 2 persons on
coding HMM
algorithms

Submission day,
Debugging GUI and
HMM algorithms
failed, Eigen faces
algorithm employed

Milestones Achieved

- We learnt about the internals of image processing and now all of us are very comfortable operating with abstract features of images and their pixel values
- After a lot of debugging, we now have an idea of how HMM works and what factors influence the likelihood of an observation sequence
- We had tried to implement Gaussian mixtures for the HMM, and so far we have found no report of such a thing being done in image recognition
- We have learnt about several new algorithms, ways of efficient computation and dealing with large amounts of data

Problems Encountered

- Copy-constructor, overloaded '=' operator and destructor had to be defined for all classes in HMM without which it led to inexplicable results
- Pointers had to be handled carefully, as even after the pointers ceased to exist the memory was still in heap, leading to memory leaks
- Calculations led to extremely small (and sometimes large) floating point numbers and scaling factors had to be defined in order to correct them
- Computing determinants and inverses of 15X15 matrices proved to be the most challenging task, and still remains a potential problem, also the 15-dimensional normal probability distribution returned very large or 0 values for probability due to apparently minor changes
- Processing time for images larger than a certain limit was very large and caused system to crash, so we had to reduce observation sequence drastically

Last Recourse

- There is an in-built Face Recognizer class in OpenCV which uses Eigen Faces/ Fisher Faces method to train and recognize images.
- Since this approach involves no working out of the internal workings of the algorithm and also has a lower recognition rate(70-80% with ORL database) than HMM approach, we had kept this as our last go to option in case HMM failed to work.
- Since we are not able to train the HMM properly due to some problems in dealing with multivariate Gaussian distribution, we had to abandon the HMM approach and use the in-built feature.
- However, we did this only on the day before submitting our project because we had no other way of making the code work.