Practicum Computational Vision: Face Recognition

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Contents

Abstract

In this session, we will work with concepts involved in the face recognition problem. In particular, we will deal with the problems of gender and subject recognition. You can download from the Campus Virtual all the material you will need for this practicum.

Gender Recognition

Let us develop different gender recognition systems using the AR-Face database[1]. The folder "CV_Face_recognition" contains some matlab functions and the file AR-Face which stores the data base.
Open the file main_gender_recognition.m corresponding to a gender classification system and follow the comments to complete the code and answer the posed questions.
There are, in total, 11 gaps with code to complete and questions to answer in the functions main.m, apply_pca.m and fold_validation.m.

- In the function main.m, the data set samples are prepared identifying data and labels (male/female) from the loaded structure.
- The function feature_extraction.m performs two different strategies to reduce dimensionality: PCA and LDA.
- apply_pca.m returns the matrix with reduced attributes. PCA strategy is used to reduce dimensionality with different dimensions (parameter dim set to dim=5) and estimate the value of dim which keep the 95% of the variance of the data.
- The function fold_validation.m defines a F-fold cross validation strategy. The data set is split to define the training set and test set from the data set. For the classification step, the method K-Nearest Neighbor (K-NN) is used.

You have to summarize the obtained results by a table for comparing the performance and including details of the feature extraction method and details of the classifier (parameter k, # nearest neighbors). Finally, make a discussion about the results and conclude with the pros and cons of the system.

Subject Recognition

Develop a subject recognition system using the same AR-Face database. Use a F-fold cross validation strategy to classify each subject using random examples of the data set in each run. Start with the file main_subject_recognition.m and use the previous code.
Answer the following questions:

1. Which are the necessary changes in the code? Detail all the changes you need to do when changing to the subject recognition problem.
2. Which is the best dimensionality reduction method for this particular problem?
3. Include error measure and confusion matrices to ilustrate the results and conclusions for the methods.
4. Comment the particularities of this problem.

[1] http://www2.ece.ohio-state.edu/ aleix/ARdatabase.html

Practicum submission

Deadline: 24 of January, 23:55h by Campus Vitual.
The material to submit is a file "StudentNames_CV_LabFaceRecognition.zip" containing:

- A report entitled "Face Recognition" containing the following Sections: Title, specification of the problem, discussion of experiments and conclusions. This reports has to contain the description about the gender recognition system and the subject recognition system developed in the exercises. It will include tables with the classification results, plots and critical discussion about the results obtained.
- The folder CV_Face_recognition with all the code and complete versions of the functions:

  main_gender_recognition.m, main_subject_recognition.m, apply_pca.m and fold_validation.m.