

Term Paper: Plan Of Action

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1 Introduction

In this term paper, we intend to investigate the application of convex optimization in the field of “Face Recognition”. Image is generally represented either as Model based representation or as Feature based representation. Linear Representation based Algorithms, which form a subclass of Model based representation, have gained popularity in the Face Recognition in the recent decade. Sparse Representation Classification (SRC) and Linear Regression Classification (LRC) are two popular variants in this class of algorithms. The LRC algorithm [2] solves the L_2 norm minimization problem over the entire training set. The class which gives the least reconstruction error is the obtained class of the face. The SRC algorithm [3] solves a second-order cone problem over the entire training set with constraint that image has sparse representation over redundant dictionary. The above two algorithms use the assumption that the entire image lies in the subspace spanned by one of the class of training samples. However, this assumption isn’t true for some of the images, particularly for those which are occluded and have partial defects.

Of late, Linear Representation Ensemble (LRE) algorithm [1] has addressed this issue by assigning classes to the patches and not the entire image, using Probabilistic Patch Representations (PPR). Thus, classification of entire image is augmentation of the classification of the patches. This algorithm considers the linear subspace assumption on patches and not the entire image. This algorithm includes finding weights vector obtained by minimization of convex cost function on the training samples.

2 Objectives

Our motivation behind implementing these three algorithms is to gain insight of the optimizations involved in them for Face Recognition application.

- We would like to implement the three algorithms on a dataset, such as Yale B dataset and make a comparative study of them.
- We would further like to observe how the three algorithms respond to the images with partial occlusion.
- We would also like to see how the relaxation of L_0 norm to L_1 norm in Sparse based classification affects the results.
- Finally, we would like to comment which algorithm is better for the Face Recognition task.

References

- [1] HANXI LI, FUMINSHEN, C. Y., AND YONGSHENGGAO. Face recognition using linear representation ensembles. In *Pattern Recognition* (2015).

- [2] IMRAN NASEEM, R. T., AND BENNAMOUN, M. Linear regression for face recognition. In *IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE* (2010), pp. 2106–2112 vol.32.
- [3] JOHN WRIGHT, ALLEN Y. YANG, A. G., AND SASTRY, S. S. Robust face recognition via sparse representation. In *IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE* (February 2009), pp. 210–227 vol.31.