Labeling Faces within Photo Albums

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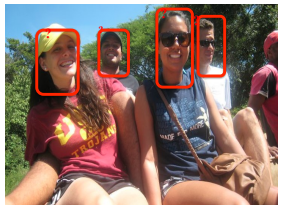
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1. Classic Problem

- Given album with multiple faces, how do we correctly label them?
- Given the album and the initial face labels, we encounter the problem of noisy labels or misclassifications





2. Dataset

- PubFig83 dataset was used for this project
- Dataset of 83 well known people with 100 or more images to their name





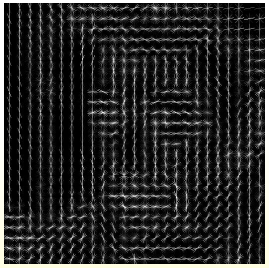
3. Methods Used

HOG

- One of the main methods I worked with was Histogram of Oriented Gradients
- Counts gradient orientation in parts of an image
- Computed on a number of cells in an image
- Method uses overlapping to improve accuracy
- First apply horizontal and vertical derivative
- Bin the angles and add weight (magnitude) to angle bins
- These bins and their weights are represented in the form of a histogram

Example:
(cell size 10)



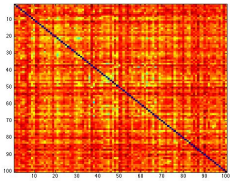


K-Nearest Neighbors

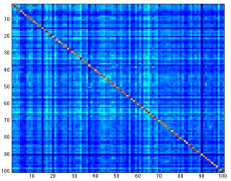
- K-nearest neighbors is a method to determine what an object in a feature space is based on the training examples close to it
- Compute pairwise distance between images
- Do this by computing cosine distance between matrix rows

Graphing kNN

- Iterate over the pairwise distance matrix
- Sort each feature in declining order
- Find top 5 k-neighbors
- Set all other rows in the matrix to 0
- Iterate over each row/threshold
- Iterate based on (i,i) where i is row number
- Set all rows above threshold to 0 or Inf (the results will appear different depending on what each space is set to)



Euclidean Distance Graph (Cell Size 10)



Distance Histogram Graph (Cell Size 10)

Graph Examples

- Above are the computed Euclidean Distance and Distance Histogram graphs
- The results were not excellent
- Tried to graph pairwise and kNN in this same way
- None of the graphs yielded good results
- Decided to experiment with SVM instead

SVM

- Continue to use PubFig83 dataset
- Feed in the testing and training labels and hog data
- Get the predicted classes
- Using the training labels and data, got an SVM model
- Using the testing labels and data, get accuracy
- Accuracy using NN 58.36
- Accuracy using SVM 87.58%

4. Conclusion

- These methods are useful in face detection but we need to do more research
- The project is still in its beginning stages I would like to continue to work on it
- Given research can be continued, we can find a much better algorithm to use in photo album labeling