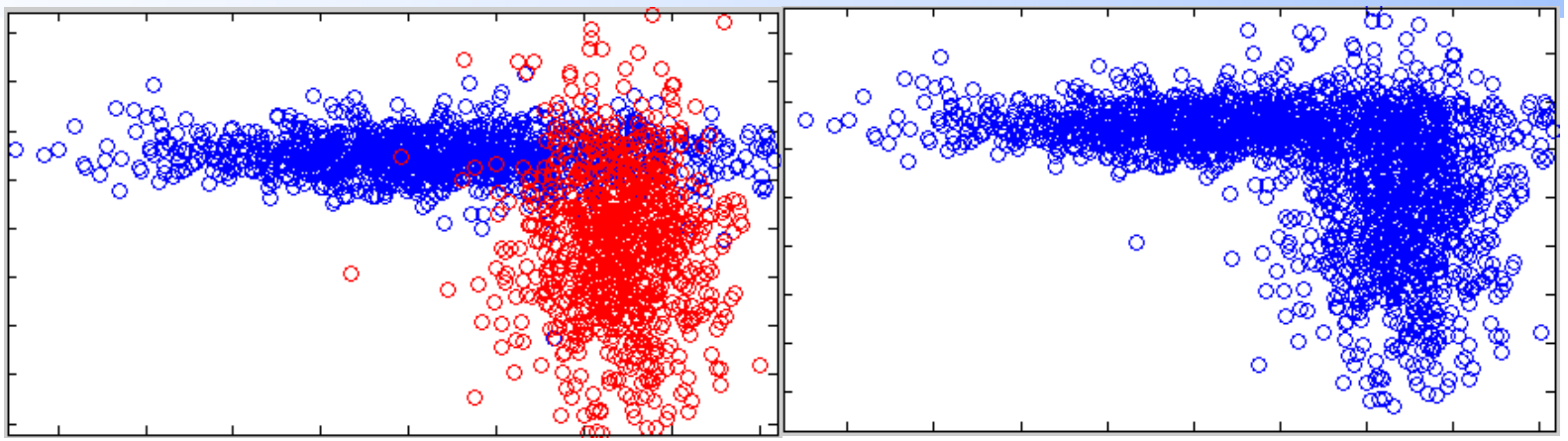
Exercise solutions

3. Parametric methods

ML (a) 90.2%

(b) 88.8%

Prior (c) 96.3%

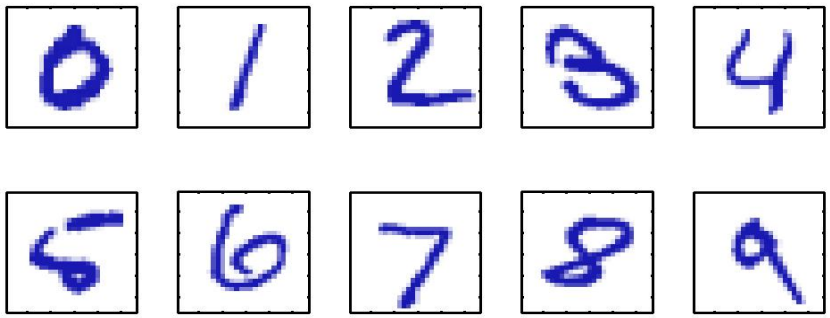


Unsupervised

It's not easy to recognize speech.

It's not easy to wreck a nice beach.

Dim = 784!



L4 - Dimensionalty reduction

L5 - Clustering

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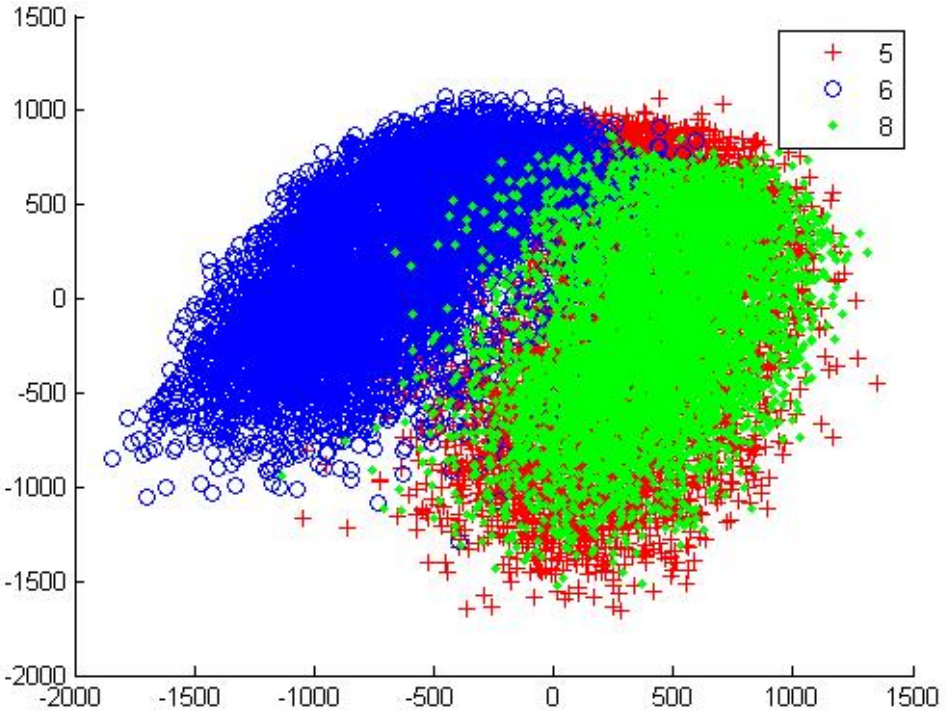
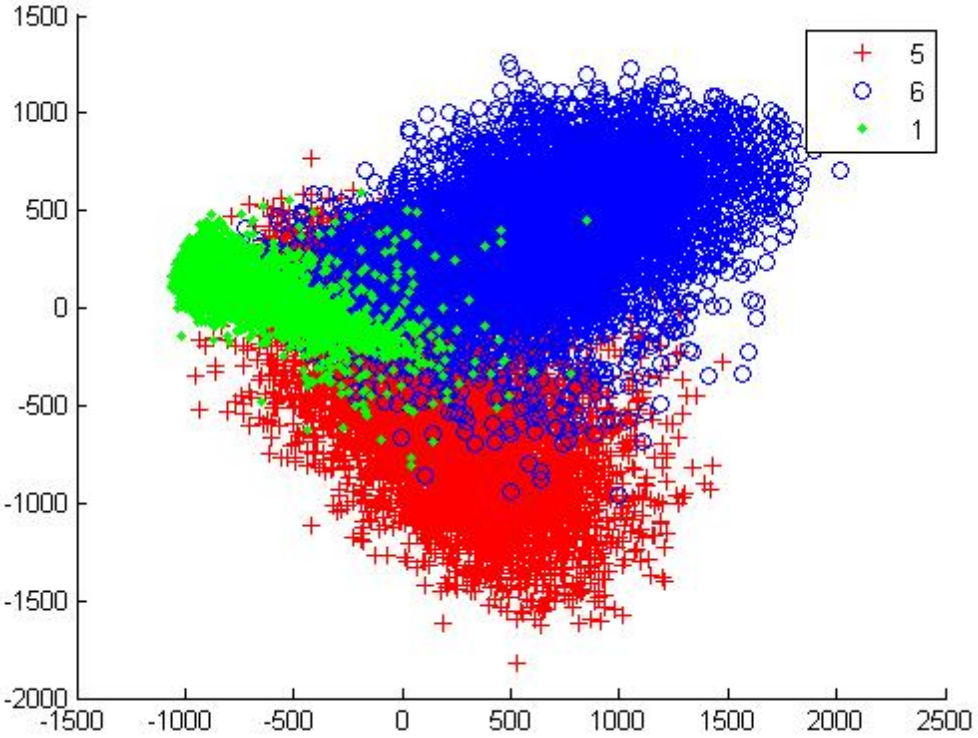
- All the data needed for the class assignments are also shared under Dropbox: link to data.
- Algorithm Illustration by Code for PCA is uploaded onto Moodle
- Include tSNE in the code

4. Dimensionality reduction

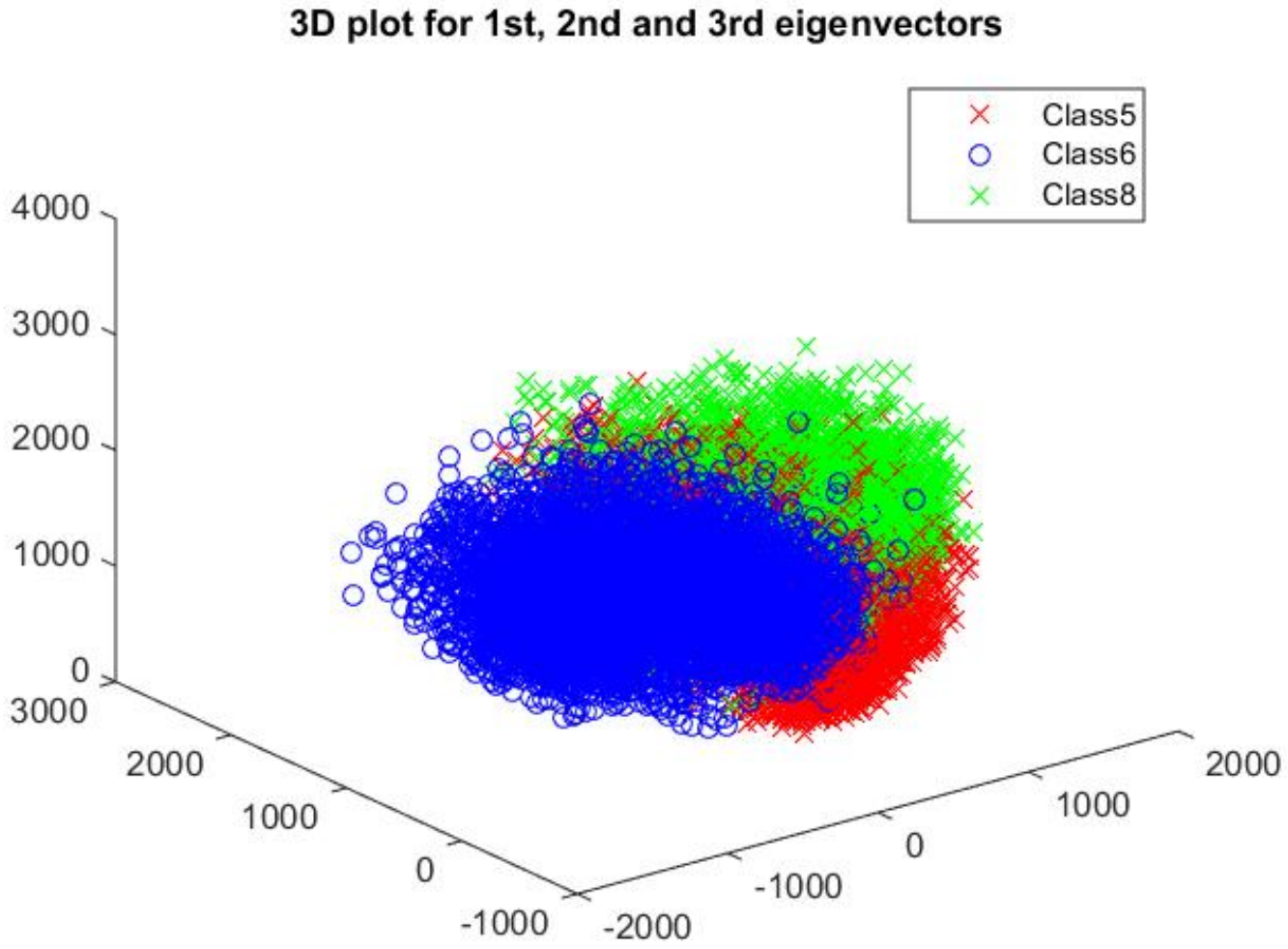




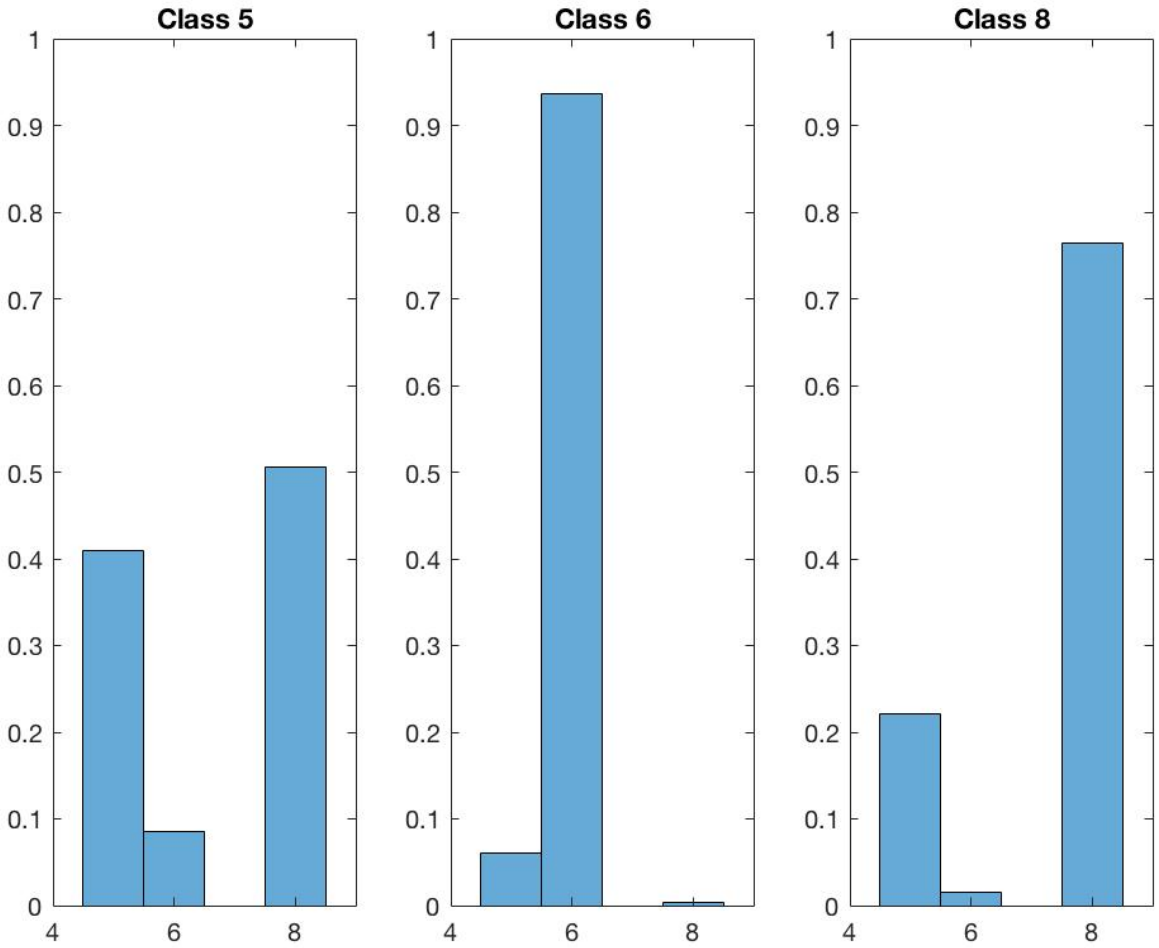
- Accuracy for 2D PCA: 71%

- Class 5 acc: 45%
- Class 6 acc: 93%
- Class 8 acc: 73%

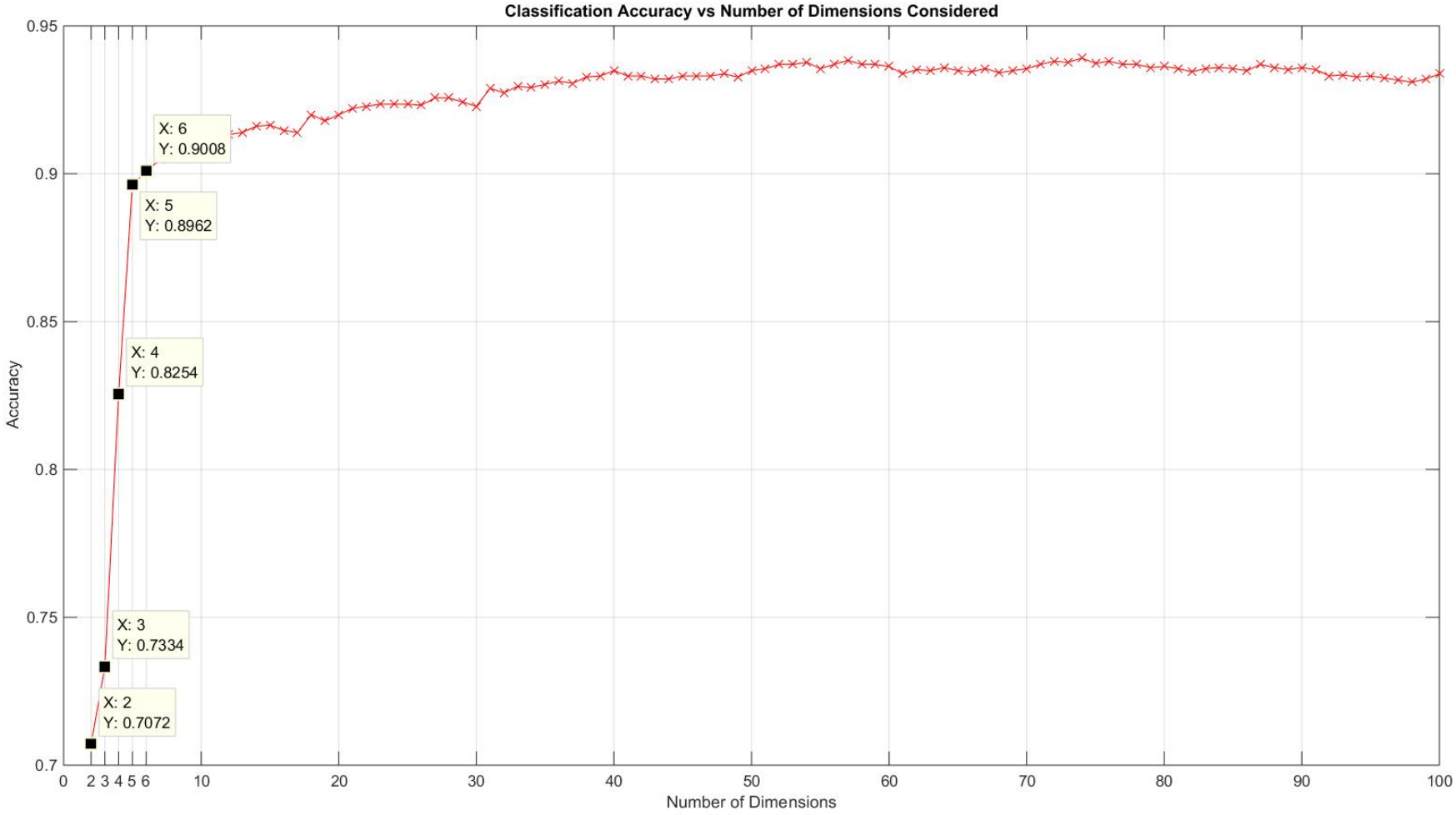
Using 3 eigenvectors for projection



Confusion plot



Accuracy vs dimensions



- Use statistics from the training data, not from test data, e.g. when using PCA!
- You have no access to the mean of the test data.

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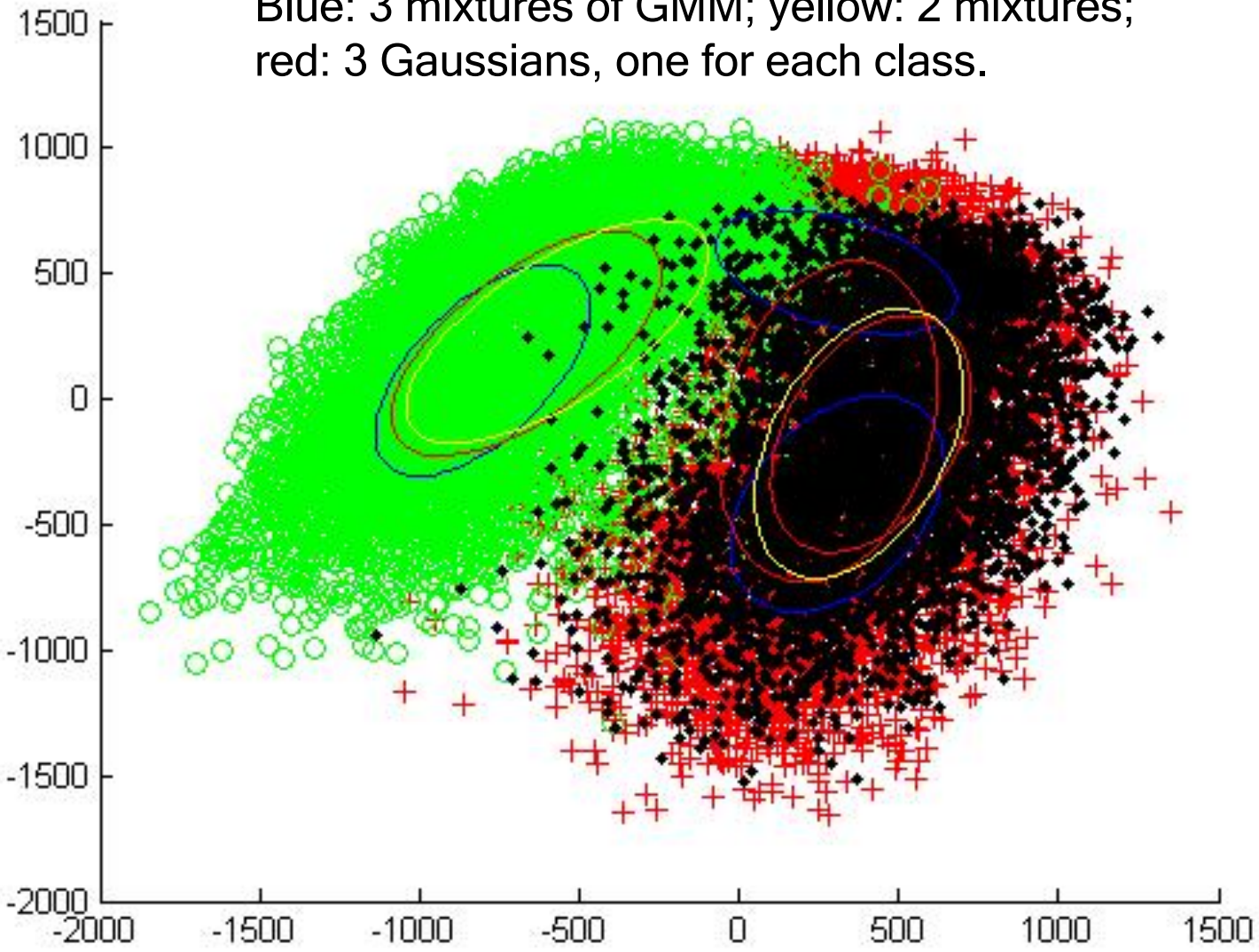
5. Clustering

Blue: 3 mixtures of GMM; yellow: 2 mixtures;
red: 3 Gaussians, one for each class.



Mini-projects

- Start to consider mini-projects
- Group and project title information by October 21.
- For mini-project slide submission and presentation, please scroll down to the end of this course homepage.

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6. Linear discrimination

For the whole dataset, 10 classes:

- PCA 10-D: 89.2%
- PCA 9-D: 87.8%
- LDA 9-D: 89.5%

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- Mini-projects

LDA and Support vector machines

For the whole dataset, 10 classes:

- PCA 10-D: 89.2%
- PCA 9-D: 87.8%
- LDA 9-D: 89.5%

- SVM 784-D: 94.5%
  - Total nSV = 19 626 (out of 60 000 training examples)