Motivations for LDA
Basic setup
Bayes’ rule classifier
Gaussian LDA
Fisher’s LDA
A patient enters the emergency room with severe stomach pains and symptoms consistent with both food poisoning and appendicitis.

A decision has to be made as to which illness is more likely for that patient.

Diagnosis leads to very different treatments. Incorrect diagnosis could be fatal.
Credit

- A bank knows from past experience that there are good customers and bad customers.
- A new customer asks for a loan.
- The bank has to decide whether or not to give the loan.
Diagnosing breast cancer

- Breast cancer is the 2nd largest cause of cancer deaths among women.
- Three methods of diagnosis are currently available: mammography, fine needle aspirate (FNA), and surgical biopsy.
- Surgical biopsy is the most accurate, but it is invasive, time consuming, and expensive.
A computer imaging system has been developed with the goal of developing a procedure that diagnoses FNAs with high accuracy.

A small-gauge needle is used to extract a fluid sample (FNA) from a patient’s breast lump or mass.

FNA placed on glass slide, stained, and imaged with video microscope.
Wisconsin Diagnostic Breast Cancer Data

- 30 features computed from the image
- Data set consists of 569 cases, 212 malignant, 357 benign
- Goal: develop a classification rule to separate the malignant lumps from the benign lumps