

Tuesday Feb 4, 2025

In-class Handout

COSC 410A Applied Machine Learning

Prof. Forrest Davis

Name:

Discuss and complete the following questions with the person nearest you. You **may** be asked to share your thoughts with the class.

For the following questions, determine which model (linear regression, logistic regression, or SVMs) is the most appropriate. Justify your answer.

1. A light bulb company is trying to find a way of making their light bulbs last longer. Based on the bulb lifespan duration of different types of bulbs, their R&D team has identified 12 different factors that might influence how long a bulb lives for. They now want to know the relative importance of each of these different factors.

Linear regression. Output is continuous, and linear regression gives us an interpretable weight for each feature (as long as they are on the same scale).

2. An investment company wants to design a system, which given a house, can advise landlords about whether or not to buy that house. They want to tailor the recommendation based on customers' risk taking setting. For example, in a low-risk setting, the system should advise them to buy houses only if there is a very high probability that the value will appreciate, whereas in a high-risk setting the probability of appreciation could be lower.

Logistic regression because we want probability of appreciation, not just a classification decision.

3. Given photos of cat faces, a researcher wants to categorize whether the face is hungry or grumpy. There are 15 different features of photos that the researcher hypothesizes can be relevant. From a quick exploratory analysis, they notice that the faces are not linearly separable in this 15-dimensional feature space. However, based on prior experience working with photos of faces, they suspect that certain transformations could help make them linearly separable.

SVM classification. Can use kernel trick for things that are not linearly separable. KNN or decision trees won't work well because of the large number of features.