

SMAI-2020-Homework

September 2020

1 Objective Question [1 mark]

Consider the equation for computing the SVD:

$$A = U\Sigma V^*$$

SVD decomposition breaks down any invertible transformation into a composition of three geometrical transformations: rotation, scaling, and reflection. True or False?

2 Subjective Question [2 marks]

Consider the tutorial notebook ‘LSI and SVD.ipynb’ and answer the following questions based on your observation.

1. Briefly explain the plot of the singular values s (or in other words, what can we say about the singular values based on its plot).
2. Are the U and Vh matrix orthonormal? How will you verify this?

3 Programming Question [3 marks]

Implement a movie recommendation system using SVD. Given the ‘Movielens 100k’ data set, your task is to implement a recommendation system using SVD and compute the root mean squared error of the test set. The exercise notebook ‘Recommender System with SVD.ipynb’ provides you with the starter code.