Price Prediction

Part I: We try to build a model to predict the price of a product. You can treat the product price as a function of time. We have the following three possible models:

1. Autoregressive model: Here, the product price at the current time slot is a linear function of the prices at the pasttime slots, i.e.,



1. Fourier series: We use the following truncated version of the Fourier series to express the change of product price over time, i.e.,



1. Taylor formula: Very similar to (2), but we adopt the truncated Taylor expansion to approximate the price function over time, i.e.,



where  denotes the product price at the *t*-th time slot, and and  are the correspsonding coefficients of each term.

In the attachments, you can find the training data (see Part1\_training\_data.txt), which can be utilized to obtain the above three models. And you can also find the testing data (see Part1\_testing\_data.txt), which can be utilized to test the validity of your obtained models. For (2) and (3), to better fit the traning data, you should choose a proper time invertal for two consecutive prices.

In this part, you need to try the above three models, and set a standard to compare which one is the best.

Part II: we aim to build a model to predict the prices of five kinds of products. The current prices of the five products are not only related to the past ones, respectively, while they are also related to each other’s price.

In this part, you need to use the best model obtained in Part I to solve this price prediction problem for five products. In the attachments, you can find the training data (see Part2\_training\_data.txt) and the testing data (see Part2\_testing\_data.txt).