

STAT3612 Assignment 2: Modeling BitCoin

Price Trend

Date: March 29, 2018

Submit via Moodle on or before April 11, 2018.

In Assignment 1, you have tried the piecewise linear modeling of the bitcoin prices with sequentially adding knots. In this assignment, try the knot selection by the lasso technique.

Step 1. (25%) Download the historical daily bitcoin prices as in Assignment 1 (click here). For the 365 days, set the equally spaced knots with every 10 days away (i.e. 10, 20, 30, ...). For each knot, construct the basis function of the following form:

$$\phi_j(t) = \begin{cases} 0 & \text{if } t \leq \tau_j \\ x - \tau_j & \text{if } \tau_j < t \leq \tau_{j+1} \\ \tau_{j+1} - \tau_j & \text{if } t > \tau_{j+1} \end{cases}$$

for each knot τ_j . Then, plot the first 5 bases and the last 5 bases on the same chart.

Step 2. (25%) Perform lasso with piecewise linear bases and BitCoin prices, by using `R:glmnet` for varying regularization parameters λ . Plot the solution paths: a). along $\|\beta\|_1$, and b). along $\log(\lambda)$.

Step 3. (25%) Based on the results in Step 2, choose an appropriate model with half number of important bases (i.e., 18 active variables). Plot the model prediction along with the BitCoin prices.

Step 4. (25%) Use either `cv.glmnet` or your own code to perform the 5-fold cross validation for selecting the regularization parameter. Plot the model prediction along with the BitCoin prices.