PREDICTING WEEKLY PEAK EXCHAGE RATE

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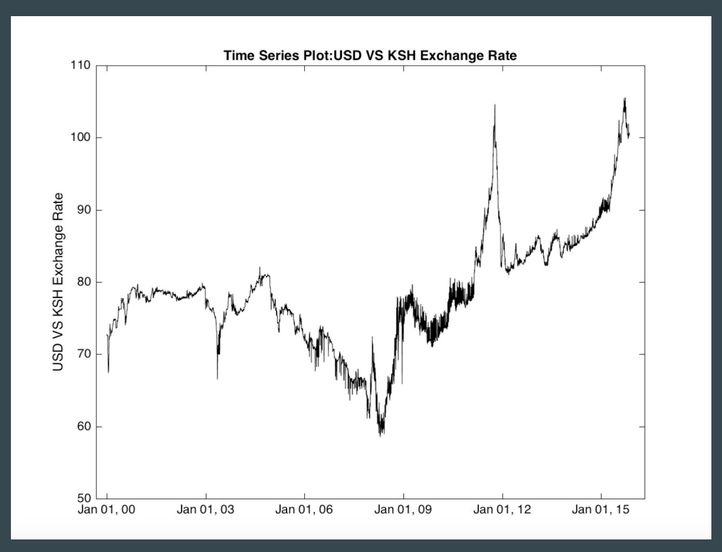
DATA

- 15 years of daily USD to Kenya Shilling exchange rate
- Annual Inflation rate, Purchasing Power Parity, External Debt, Balance on Trade and Services, Interest Rates for past 15 years
- Trained on 70% of data and used 30% for cross validation



REPRESENTATION 1

Regressed on sliding seven day data window. Target variable was exchange rate for day at end of window

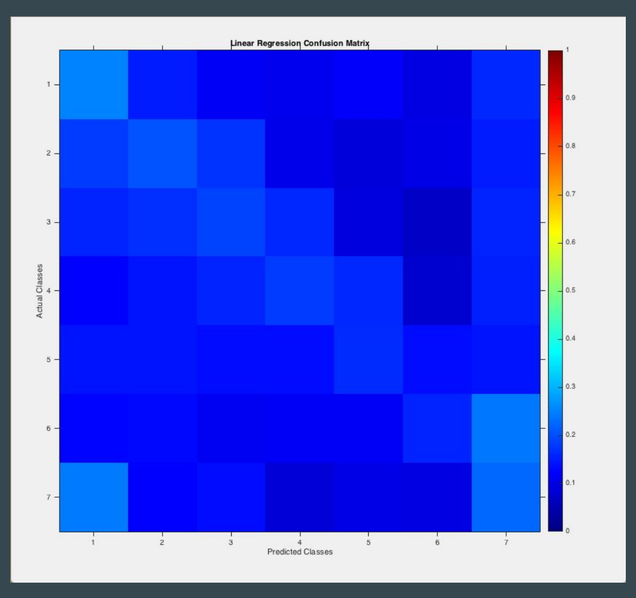
LINEAR REGRESSION

Performance Metrics:

Generalization Error - 79.58%

Average difference - 0.78

Confusion Matrix



LOCALLY WEIGHTED LINEAR REGRESSION

$$w(i) = e^{\left(-\frac{(x - x^{(i)})^2}{\tau} - \frac{\gamma(i-1)}{m}\right)}$$

where γ = closeness factor

m = number of training samples

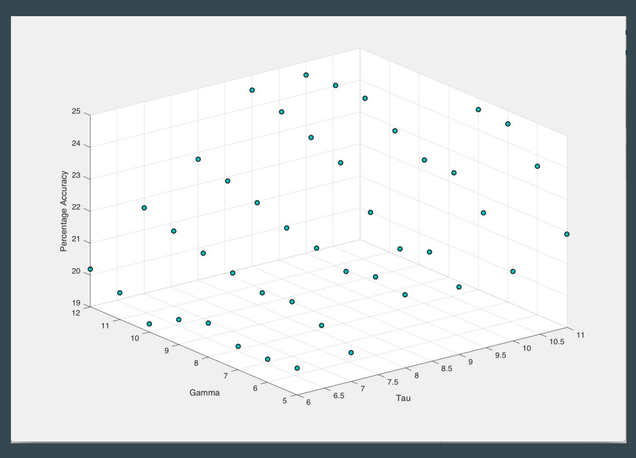
Performance Metrics:

Best τ = 12.00 Best closeness = 10

Best τ , closeness pair = (10, 10);

Generalization Error - 75.07%

Average difference - 1.42



REPRESENTATION 2

Data divided into 7 day features with target variable being the day, d, within the week with peak exchange rate. d = {0, 1 .... 5, 6}

MODELS

MULTICLASS SVM

problem:

$$\min_{\boldsymbol{w}_m, \xi_i} \quad \frac{1}{2}\sum_{m=1}^{k} \boldsymbol{w}_m^T \boldsymbol{w}_m + C\sum_{i=1}^{l} \xi_i$$

$$\text{subject to} \quad \boldsymbol{w}_{y_i}^T \boldsymbol{x}_i - \boldsymbol{w}_m^T \boldsymbol{x}_i \geq e_i^m - \xi_i, \ i = 1, \ldots, l, \qquad (12)$$

where

$$e_i^m = \begin{cases} 0 & \text{if } y_i = m, \\ 1 & \text{if } y_i \neq m. \end{cases}$$

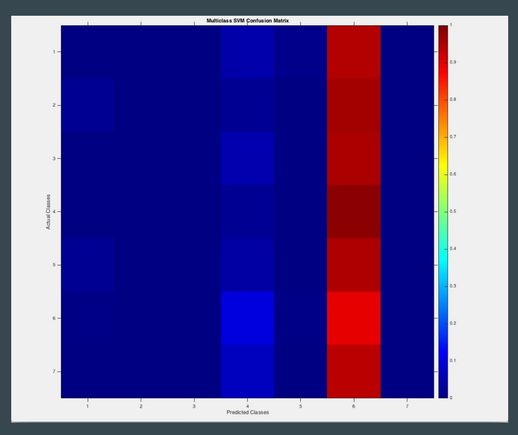
The decision function is

$$\arg\max_{m=1,\ldots,k} \boldsymbol{w}_m^T \boldsymbol{x}.$$

- Used one versus the rest approach
- Linear Kernel
- Performed regularization by varying C

- Performance plateaued at **27.86%** accuracy
- Including non-exchange rate data decreased performance.
- **Inflation and Balance of Goods and Services**, chosen from feature selection. Performance - **27.4% accuracy**

Confusion Matrix



SOFTMAX REGRESSION

$$P(y = j|\mathbf{x}) = \frac{e^{\mathbf{x}^\top \mathbf{w}_j}}{\sum_{k=1}^{K} e^{\mathbf{x}^\top \mathbf{w}_k}}$$

- Obtained 24% accuracy on testing set