

## One Step Forecasting Model {Simple Model}

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### Abstract

In this research investigation, the author has presented two models of One Step Forecasting.

### Theory

Given,

$$Y_n = \{y_1, y_2, y_3, \dots, y_{n-1}, y_n\}$$

$$Y_{\{(k+1) \rightarrow n\}, \{1 \rightarrow k\}} = \left\{ \overbrace{y_{k+1}, y_{k+2}, \dots, y_{n-1}, y_n}^{\{(k+1) \rightarrow n\}}, \overbrace{y_1, y_2, y_3, \dots, y_k}^{\{1 \rightarrow k\}} \right\}$$

$$\hat{Y}_{\{(k+1) \rightarrow n\}, \{1 \rightarrow k\}} = \frac{\left\{ \overbrace{y_{k+1}, y_{k+2}, \dots, y_{n-1}, y_n}^{\{(k+1) \rightarrow n\}}, \overbrace{y_1, y_2, y_3, \dots, y_k}^{\{1 \rightarrow k\}} \right\}}{\left\{ \sum_{i=1}^n y_i^2 \right\}^{1/2}}$$

$$\hat{Y}_n = \frac{\{y_1, y_2, y_3, \dots, y_{n-1}, y_n\}}{\left\{ \sum_{i=1}^n y_i^2 \right\}^{1/2}}$$

$$\text{Cosin } e\text{Similarity}(\hat{Y}_n, \hat{Y}_{\{(k+1) \rightarrow n\}, \{1 \rightarrow k\}}) = \text{Dot Product}(\hat{Y}_n, \hat{Y}_{\{(k+1) \rightarrow n\}, \{1 \rightarrow k\}})$$

## Model

$$y_{n+1} = \sum_{k=0}^{n-1} (\alpha_{n-k})(y_{n-k})$$

Case 1:

$$\alpha_{n-k} = \frac{\text{Cosin eSimilarity}(\hat{Y}_n, \hat{Y}_{\{(k+1) \rightarrow n\}, \{1 \rightarrow k\}})}{\left\{ \sum_{k=0}^{n-1} \left\{ \text{Cosin eSimilarity}(\hat{Y}_n, \hat{Y}_{\{(k+1) \rightarrow n\}, \{1 \rightarrow k\}}) \right\}^2 \right\}^{1/2}}$$

Case 2 :

$$\alpha_{n-k} = \frac{\text{Cosin eSimilarity}(\hat{Y}_n, \hat{Y}_{\{(k+1) \rightarrow n\}, \{1 \rightarrow k\}})}{\sum_{k=0}^{n-1} \left\{ \text{Cosin eSimilarity}(\hat{Y}_n, \hat{Y}_{\{(k+1) \rightarrow n\}, \{1 \rightarrow k\}}) \right\}}$$

## Results

### Model

For the Model, when the first 8 Primes Numbers, i.e.,  $Y_n = \{2, 3, 5, 7, 11, 13, 17, 19\}$  were taken to predict the next Number, a result of 22.8606 was found. The next Prime Number being 23, the Error % was (23-22.8606)

$$\text{Error \%} = \left\{ \frac{(23 - 22.8606)}{23} \right\} \times 100 = 0.606087\%$$

## References

1. [http://www.vixra.org/author/ramesh\\_chandra\\_bagadi](http://www.vixra.org/author/ramesh_chandra_bagadi)
2. <http://www.philica.com/advancedsearch.php?author=12897>