



Dollar Index futures forecasting

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The U.S. Dollar Index (USDX)

Dollar Index is a leading benchmark for the international value of the US dollar and the world's most widely recognized traded currency index. It represents the value of the US dollar relative to a basket of world currencies.

- Euro (EUR), 57.6% weight
- Japanese Yen (JPY), 13.6% weight
- British Pound (GBP), 11.9% weight
- Canadian Dollar (CAD), 9.1% weight
- Swedish Krona (SEK), 4.2% weight
- Swiss Franc (CHF), 3.6% weight

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The goal of the project: forecasting Dollar Index daily return

Data: 12 years of daily quotes, 3058 observations, 64 features

Features classes: currency exchange rates, major world indices
futures, commodities futures, government bond
prices and yields, banks interest rates

Metrics of success: on top of results from modeling simulate trade

- “Buy or sell” strategy
- Only “Buy” strategy
- Only “Sell” strategy

identify the most important features

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Data sources:

Quandl.com

Fred.stlouisfed.org

Federalreserve.gov

Treasury.gov

Bankofengland.co.uk

Ecb.europa.eu

Snb.ch

Db.com

Imf.org

Investing.com

Stooq.com

Financial data API

Fed reserve bank of St. Louis API

Federal reserve system

US department of treasury

Bank of England

European Central Bank

Swiss National Bank

Deutsche Bank

International Monetary Fund

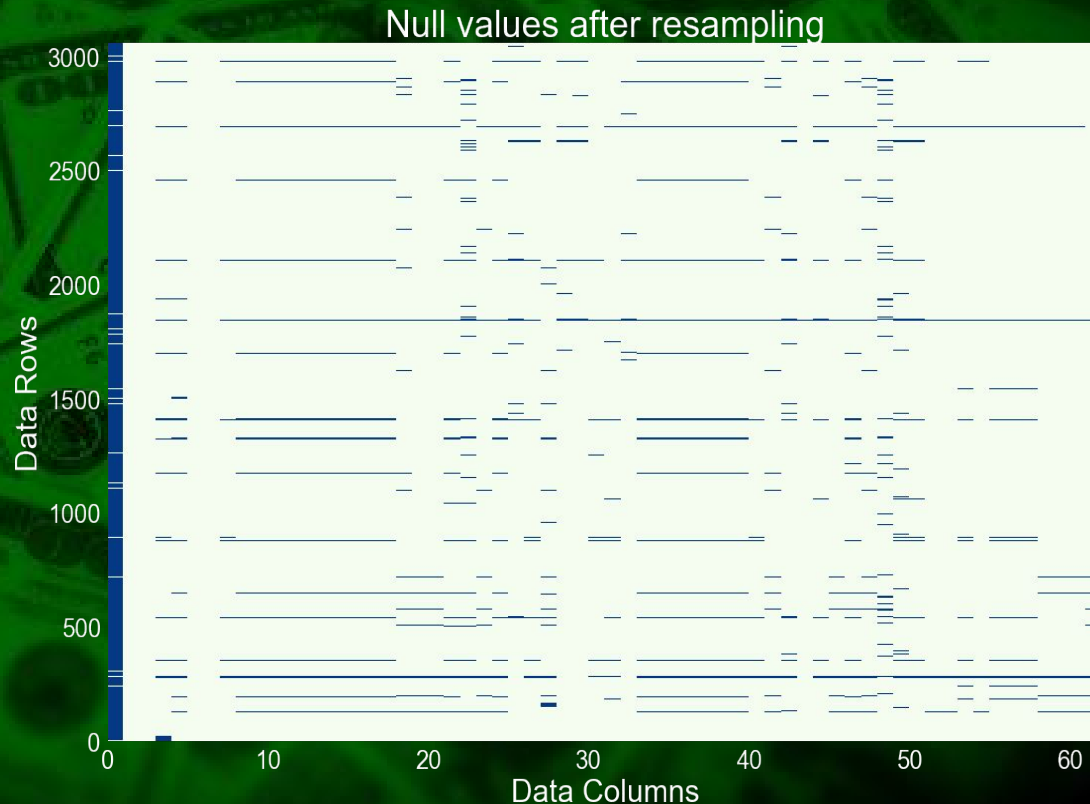
Financial Data and quotes

Quotes and news

The U.S. Dollar Index (USDIX)

Data dimensions:

- 3058 rows
- 64 columns
- 12 475 Null values (6%)
- 2005 - 2017 years



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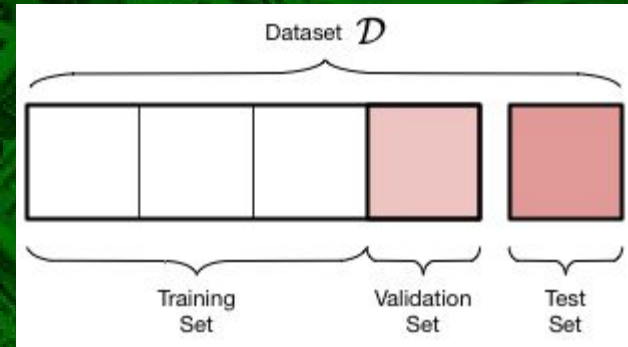
Feature engineering process:

- resample the data by business days
- fill the null values with forward fill method
- transform actual prices to daily returns
- create new features:
 - 5 days rolling mean
 - 5 days rolling standard deviation
 - 5 days rolling max
 - 5 days rolling min
- create target variable: next day return converted to binary

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Modeling:

- Training / Validation / Test split
 - training + validation (2005 - 2015)
 - test (2015 - 2017)
- Standardizing variables
- build 10 classification models
- Cross validation with parameter tuning using GridSearchCV
- Compare the results
- Choose the best performing model to predict the target variable



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Models performance:

Decision Tree Classifier:

Accuracy score: 54%

Precision score: 56%

Recall score: 57%

Baseline score: 52%

	Accuracy score	Precision score	Recall score
DecisionTreeClassifier	0.538934	0.555133	0.574803
RandomForestClassifier	0.516393	0.554217	0.362205
BernoulliNB	0.514344	0.538117	0.472441
SVC	0.500000	0.536232	0.291339
ExtraTreeClassifier	0.508197	0.529661	0.492126
GradientBoostingClassifier	0.506148	0.528139	0.480315
AdaBoostClassifier	0.502049	0.522634	0.500000
AdaBoostClassifier SGD	0.500000	0.521739	0.472441
BaggingClassifier	0.489754	0.511013	0.456693
KNeighborsClassifier	0.477459	0.495935	0.240157

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Feature importance:

- 10 Year France Bond yield
- UK effective exchange rate
- UK FTSE index
- 30 Years US Bond Futures
- EONIA Rate

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Trading simulation over 2 years period (2015 - 2017):

“Buy and sell” strategy: 8.5%

Daily returns:

- Total profitable days: 312
- Average profit: 0.35%
- Max profit: 2.09%
- Total losing days: 298
- Average loss: 0.35%
- Max loss: 2.6%

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Next steps:

Model performance can be improved:

- by using PCA transformation to reduce multicollinearity
- by tuning parameters to maximize precision or recall scores
- by collecting more detailed and complete data
- by focusing on the most important features