Forcasting and nowcasting

Towards predicting the next financial crisis

Presentation overview

- Our plan
- Descriptive statistics
- Benchmark model
- Principal component analysis
- Results
- Next steps

Plan

1. explore the dataset
2. define a target variable
3. feature selection and preprocessing
4. choose models for initial benchmarking
5. choose evaluation metrics
6. *Hyperparameter tuning*
7. *Integrate MLFLOW to store experiments results*
8. *evaluate the models peformance*

Exploration

Descriptive statistics

1.1 Data preperation pipeline

```
COUNTRY = 'DE'
FILE = './data/data_input_quarterly.csv'
TIME_INTERVALL = "quarterly"

df = read_data(FILE, COUNTRY)
df = get_processed_df(df, COUNTRY,TIME_INTERVALL, verbose=True)
df = subselect_data(df)
```

1.2 Data preperation pipeline

```
df = give_sliding_window_volatility(df, 4, "fx")
df = calculate_growth_rates(df, yoy_variables)
df = get_lagged_variables(df, 2, lag2_variables)
df = add_missing_variables(df, country)
df = add_systemic_risk_dummy_with_df(df, df_dummies, country)
```

Target value

- Systemic crisis *(dummy)*
- Systemic stress *continuous*
- Inflaction *?*

PCA intuition

- Principal component analysis (PCA) reduces the number of dimensions in large datasets to principal components
- Retain original information.
- Tansforming potentially correlated variables into a smaller set of variables, called principal components.

(between us: just let Sklearn do the magic)

PCA Pipeline

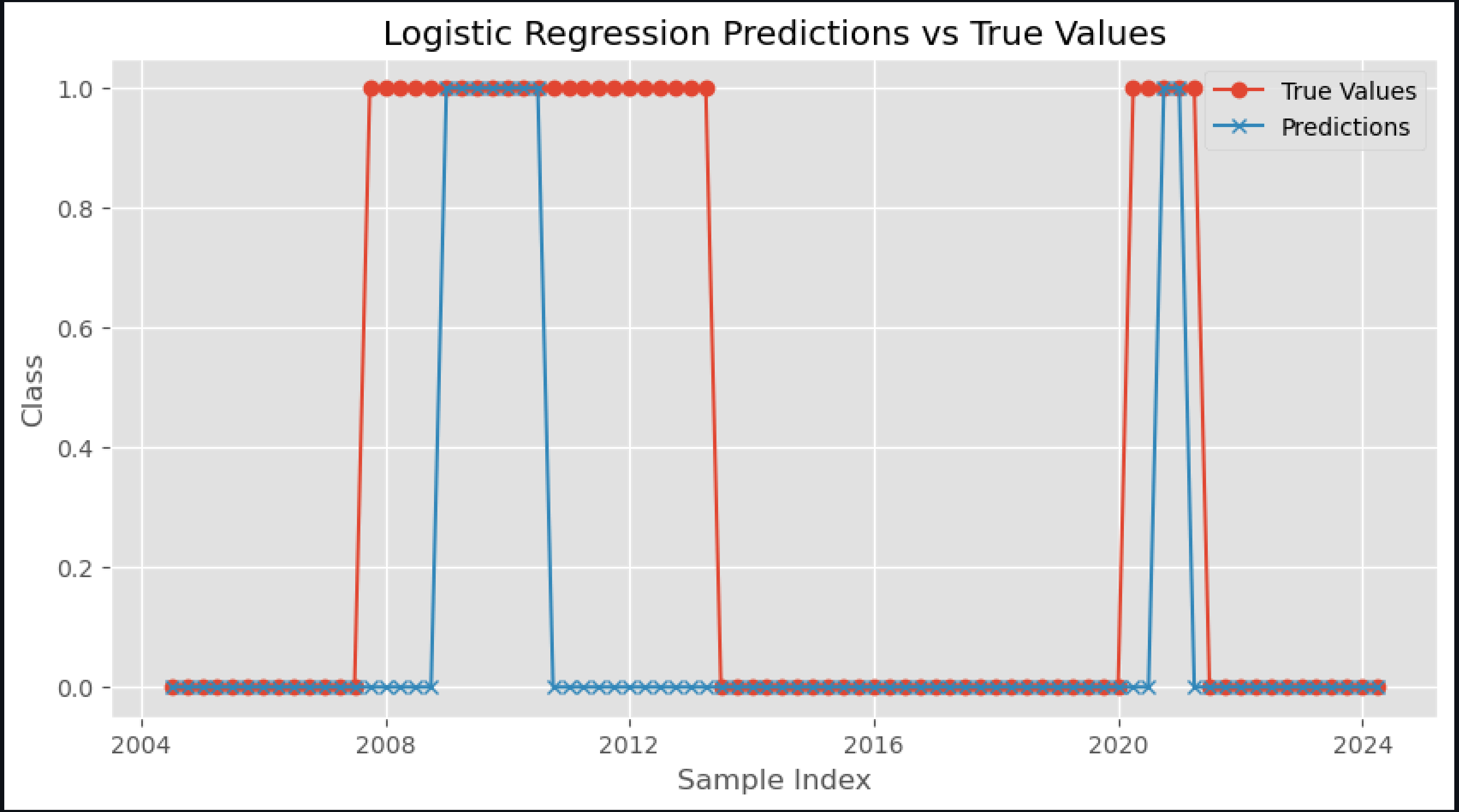
```python
from sklearn.decomposition import PCA

pca = PCA()
principalComponents = pca.fit_transform(X_SCALED)
PCA_components = pd.DataFrame(principalComponents)

explained_variance_ratio = pca.explained_variance_ratio_
_target_variance = 0.80
_current_variance = 0.0
_num_features = 0

while _current_variance < _target_variance:
    _current_variance += explained_variance_ratio[num_features]
    _num_features += 1
```

PCA - preprocessed result



It seems to be too late, however, COVID-19 is exogenous and could not have been predicted. However, result is stable