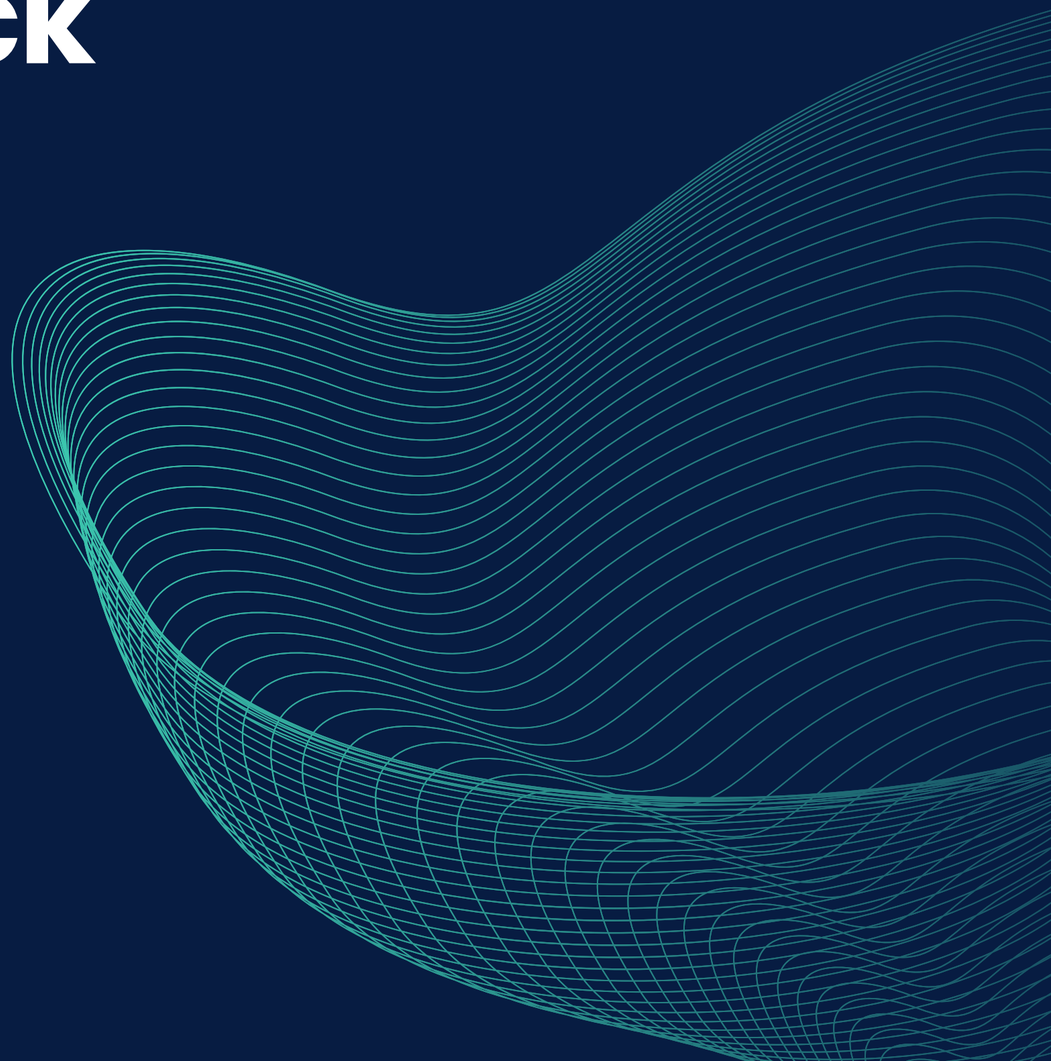
Can we predict stock market using few variables?

Few steps used to predict market movement using few financial assets price



Step 1: Importing libraries

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

# Import the statsmodel module.
import statsmodels.api as sm
# Import the ols function from statsmodels.
from statsmodels.formula.api import ols
```

```
data = pd.read_csv('market.csv')

data.head()
```

	Date	oil	gold	rus	sp
0	04/11/2023	81.53	2019.0	1772.44	4136.50
1	04/10/2023	79.74	2003.8	1754.46	4136.25
2	04/06/2023	80.70	2026.4	1752.13	4132.00
3	04/05/2023	80.61	2020.9	1769.65	4117.25
4	04/04/2023	80.71	2022.2	1802.31	4129.00

Step 2: Data exploration

Start with an exploratory data analysis to familiarize yourself with the data and prepare it for modeling.

The features in the data are:

- Oil - Crude oil futures on the New York Mercantile Exchange (NYMEX) are the world's most actively traded futures contract on a physical commodity (in dollars)
- Gold - Gold futures on the New York Mercantile Exchange (NYMEX) are the most actively traded futures contract on a physical commodity (in dollars)
- Russell - E-mini Russell futures track the Russell 2000 Index, which measures the performance of the 2,000 smallest companies in the Russell 3000 Index (in dollars)
- S&P 500 - E-mini S&P 500 futures are based on the underlying SPX and closely track the U.S. benchmark(in dollars)

Step 3: Model building

```
# Define the OLS formula.
ols_formula_mul = 'sp ~ oil + gold + rus'

# Create an OLS model.
OLS = ols(formula = ols_formula_mul, data = data)

# Fit the model.
model_mul = OLS.fit()

# Save the results summary.
model_results_mul = model_mul.summary()

# Display the model results.
model_results_mul
```

OLS Regression Results

Dep. Variable:	sp	**R-squared:**	0.941
Model:	OLS	**Adj. R-squared:**	0.941
Method:	Least Squares	**F-statistic:**	6685.
Date:	Wed, 12 Apr 2023	**Prob (F-statistic):**	0.00
Time:	10:41:46	**Log-Likelihood:**	-8189.3
No. Observations:	1260	**AIC:**	1.639e+04
Df Residuals:	1256	**BIC:**	1.641e+04
Df Model:	3		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	-1013.8087	33.302	-30.443	0.000	-1079.142	-948.476
oil	6.9634	0.263	26.436	0.000	6.447	7.480
gold	1.2509	0.021	59.132	0.000	1.209	1.292
rus	1.1408	0.019	58.931	0.000	1.103	1.179

Step 4: Interpret the model results

Point: The R-squared on the top right of the output above measures the proportion of variation in the dependent variable (Y) explained by the independent variables (X).

Using oil, gold , russell as Xs result in a linear regression model with $R2=0.941$. In other words, the above variables explain 94.1% of the variation in S&P500 future.

Point: The p-value for all coefficients is 0.000 , meaning all coefficients are statistically significant at $p=0.05$.

Point: The relationship between Xs and Y in the form of a linear equation

the model coefficients are:

- $\beta 0=-1013.81$
- $\beta Oil=6.96$
- $\beta Gold=1.25$
- $\beta Russell=1.14$

$$S\&P500=-1013.81-6.96*XOil+1.25*XGold+1.14*XRussell$$