

# Máster en Ingeniería del Software: Cloud, Datos y Gestión TI

## Machine Learning Engineering (MLE)

**Investigating different stock market prices and making predictions through the application of ML techniques**



# Índice general

1. Temática y datos para proyecto
2. Conceptos y técnicas
3. Resultados
4. Conclusiones

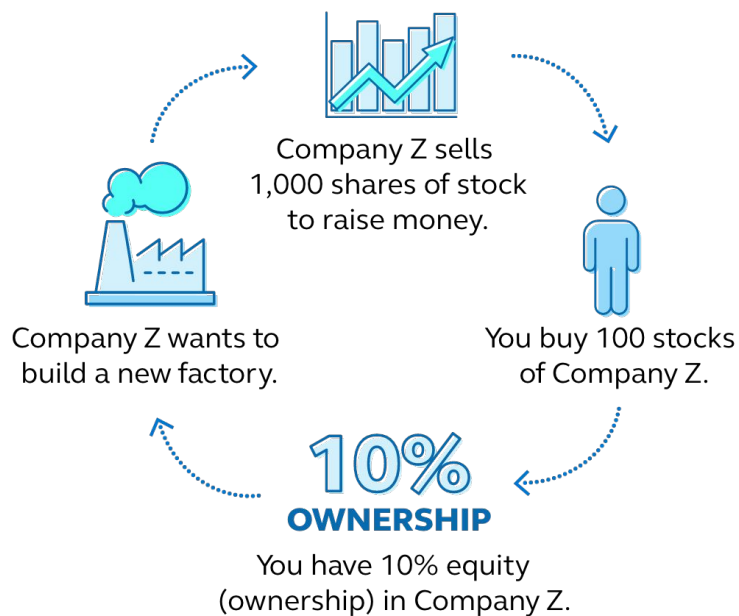
# Índice general

1. Temática y datos para proyecto
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# 1. Temática y datos para proyecto

01 - 26

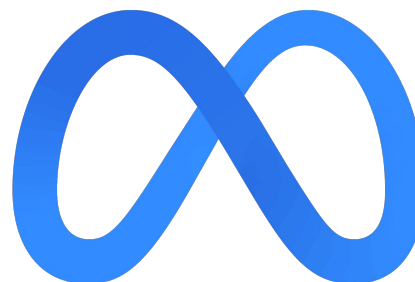
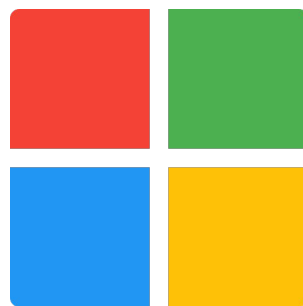
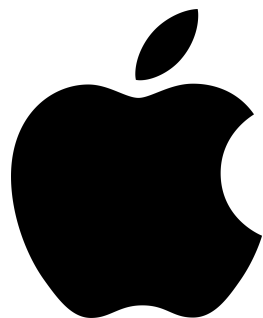
## Mundo bursátil



# 1. Temática y datos para proyecto

02 - 26

Datasets (2018-2022)



# 1. Temática y datos para proyecto

03 - 26

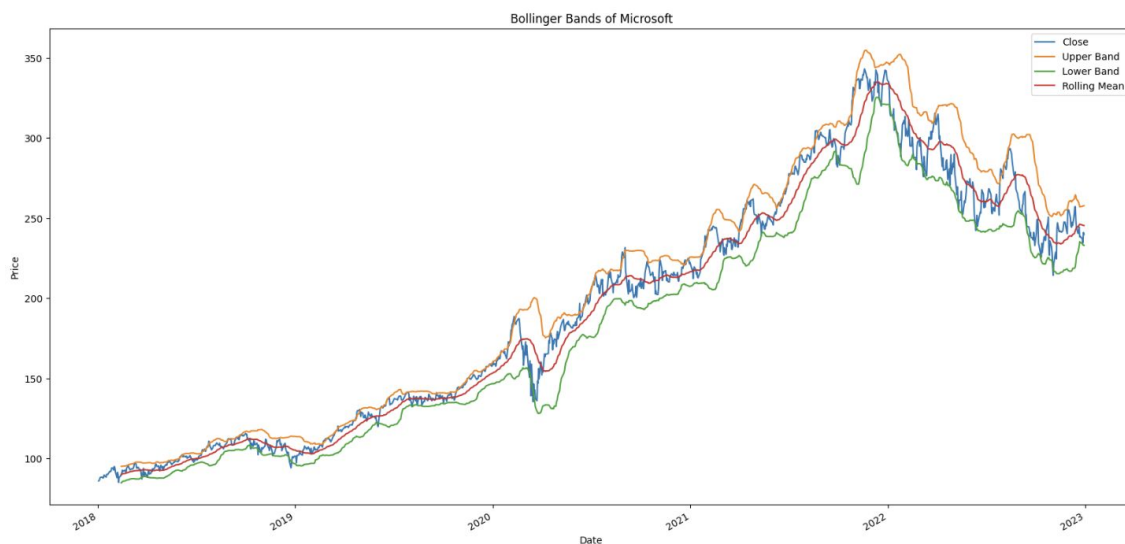
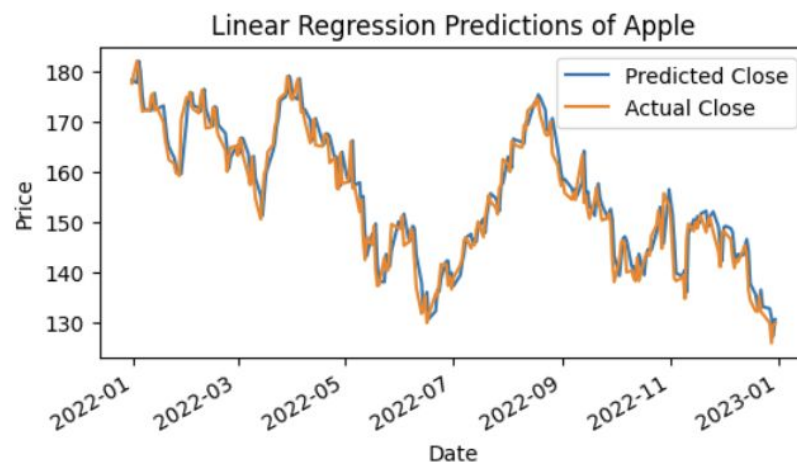
## Dataset

<u>Open</u>	<u>High</u>	<u>Low</u>	<u>Close</u>	<u>Adj Close</u>	<u>Volume</u>
169.929993	173.470001	169.690002	171.139999	170.152466	195432700
168.279999	170.580002	167.460007	169.750000	168.770493	107499100
171.559998	173.199997	169.119995	172.990005	171.991791	91185900
173.039993	175.860001	172.149994	175.639999	174.626495	92135300
175.850006	176.850006	175.270004	176.279999	175.262817	68356600
177.089996	180.419998	177.070007	180.330002	179.289459	74919600
180.160004	181.330002	178.529999	179.289993	178.255432	79144300
179.330002	180.630005	178.139999	179.380005	178.344925	62348900
179.470001	180.570007	178.089996	178.199997	177.171722	59773000
178.089996	179.229996	177.259995	177.570007	176.545364	64062300
177.830002	182.880005	177.710007	182.009995	180.959732	104487900
182.630005	182.940002	179.119995	179.699997	178.663071	99310400

# 1. Temática y datos para proyecto

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## Estudio de mercado + predicciones



# Índice general

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# 2. Conceptos y técnicas

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## Conceptos

- Volatilidad
- Bandas de Bollinger
- Daily return

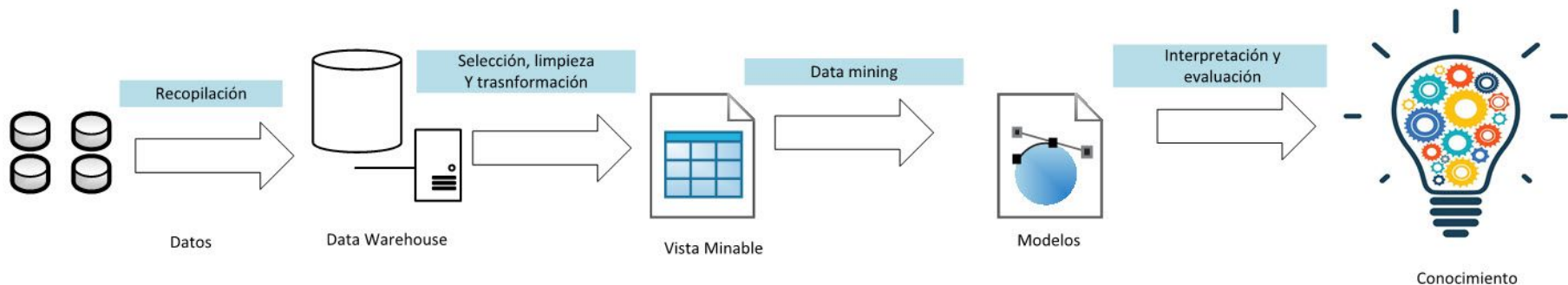


## 2. Conceptos y técnicas

### Técnicas

06 - 26

- Preprocesamiento
- Correlación
- Visualización (daily returns, evolución mercado, Bollinger bands)
- Entrenamiento de modelos (LR, RF, LSTM, XGB)
- Evaluación
- Predicción



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# 3. Resultados

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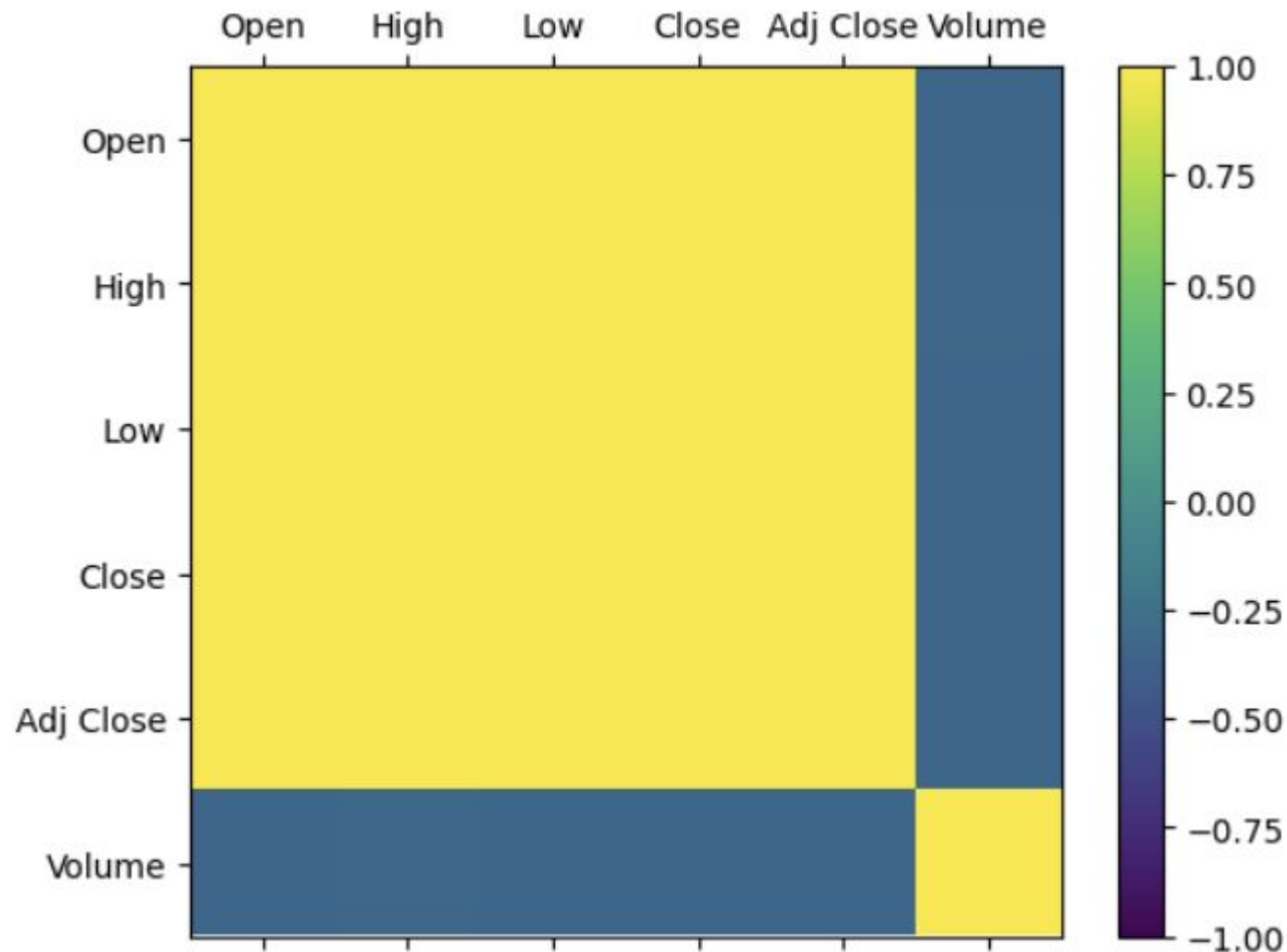
## Preprocesamiento

```
def preprocessing(original_df):  
    df = original_df.copy()  
    df['Date'] = pd.to_datetime(df['Date'])  
    df.set_index('Date', inplace=True)  
    df['Open'] = df['Open'].astype('float')  
    df['High'] = df['High'].astype('float')  
    df['Low'] = df['Low'].astype('float')  
    df['Close'] = df['Close'].astype('float')  
    df['Adj Close'] = df['Adj Close'].astype('float')  
    df['Volume'] = df['Volume'].astype('int')  
    return df
```

# 3. Resultados

08 - 26

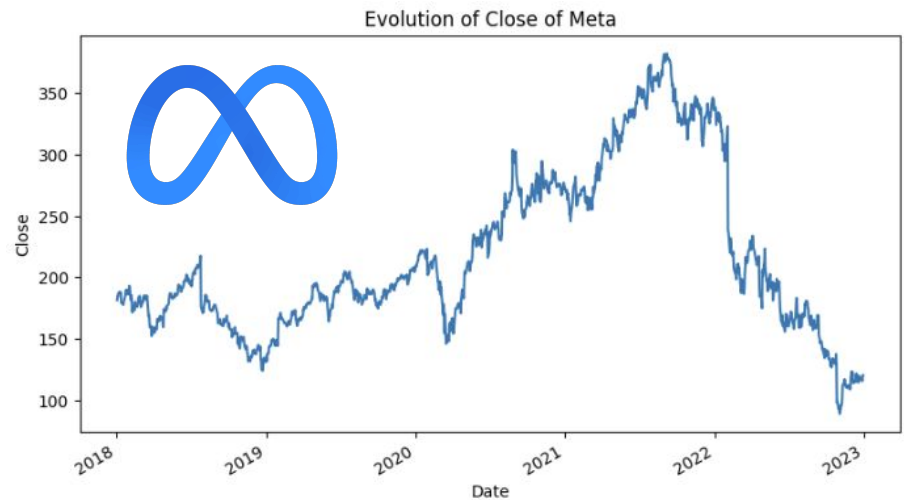
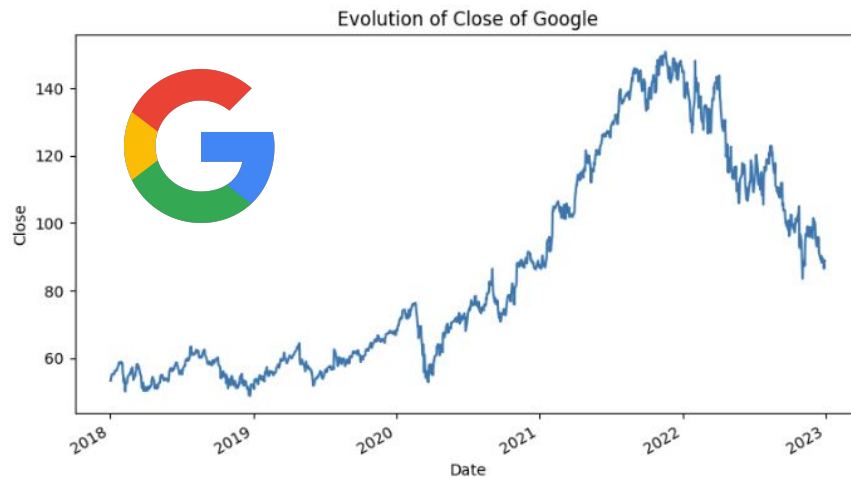
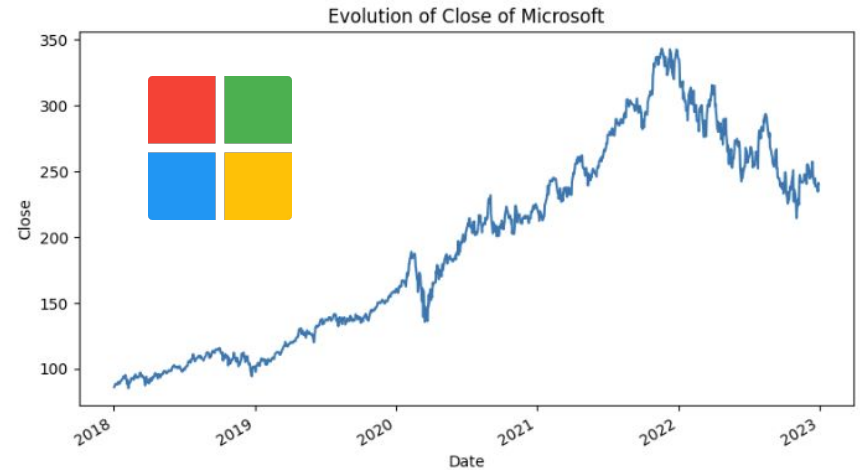
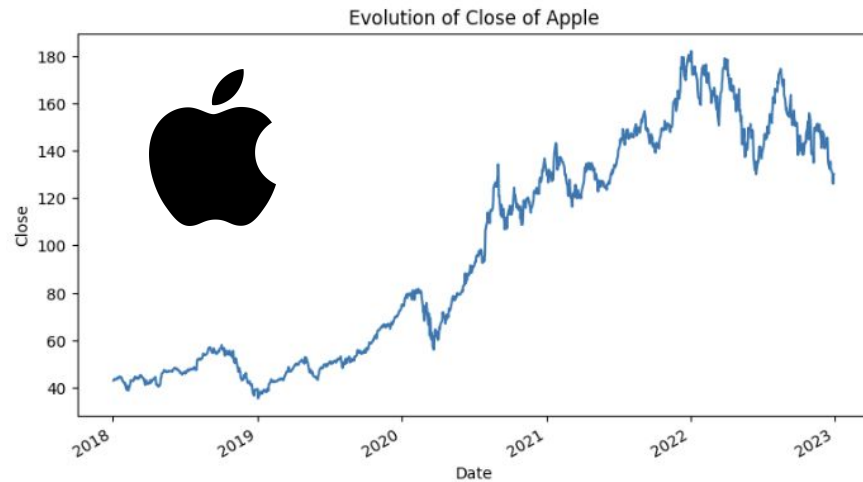
## Correlación entre atributos



# 3. Resultados

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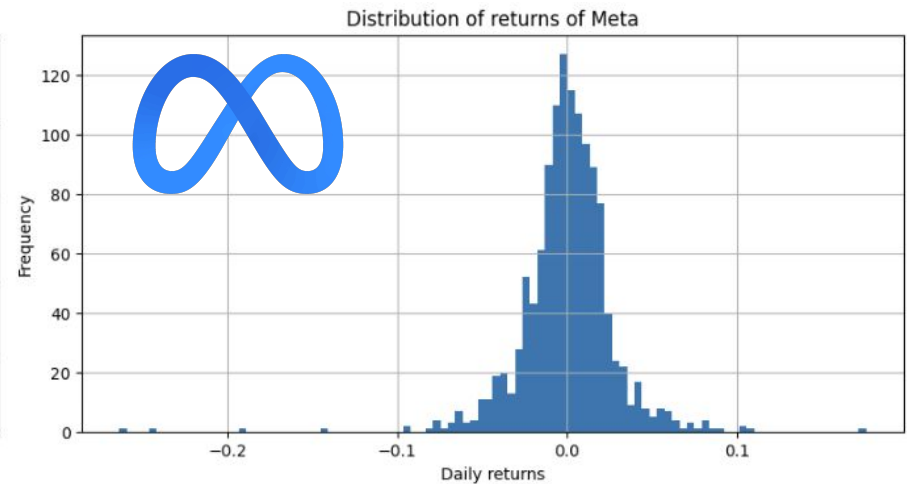
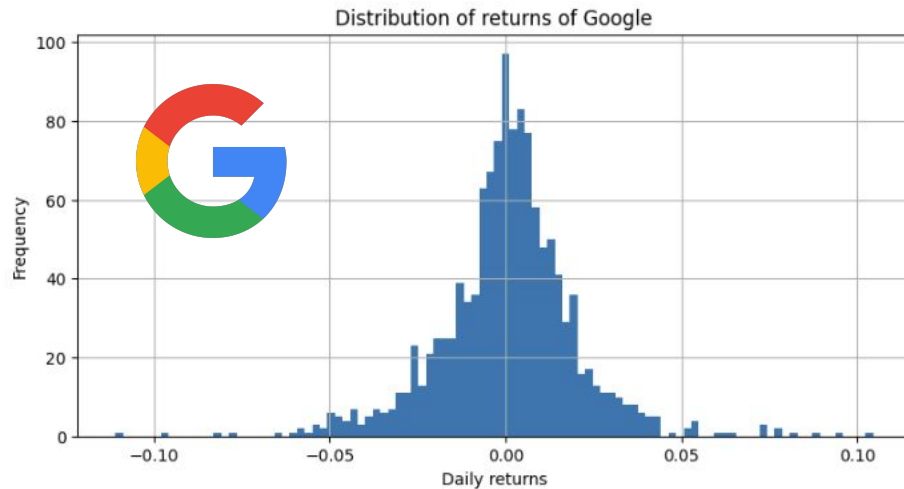
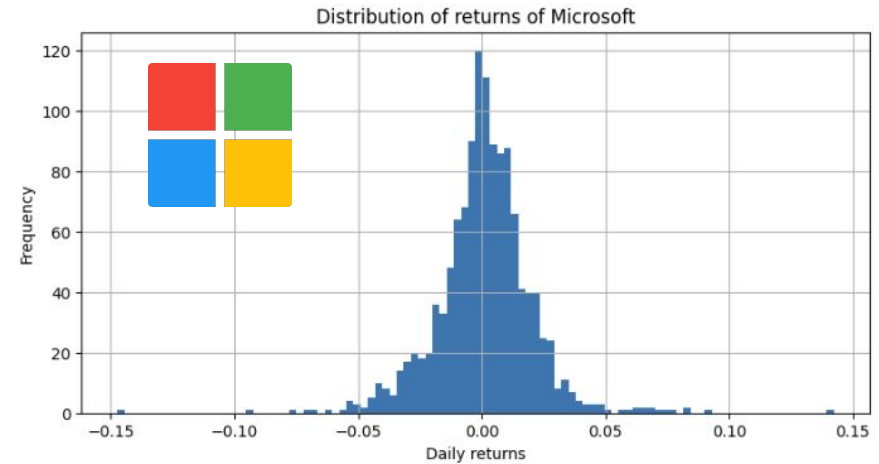
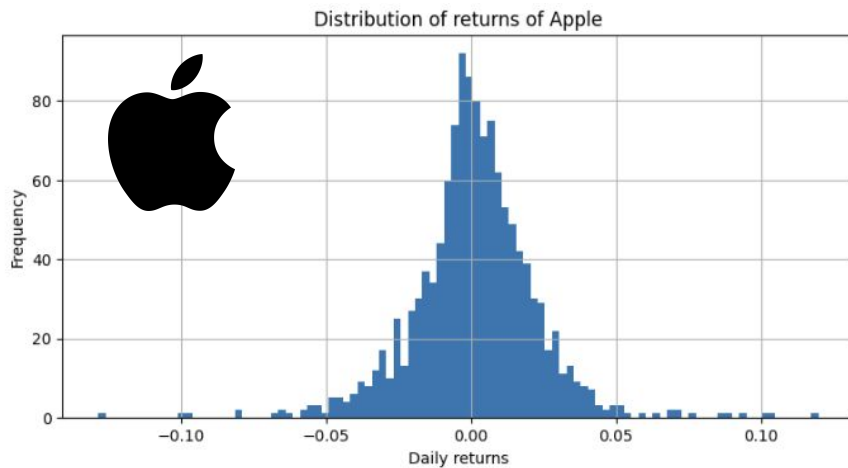
## Evolución y distribución de daily returns



# 3. Resultados

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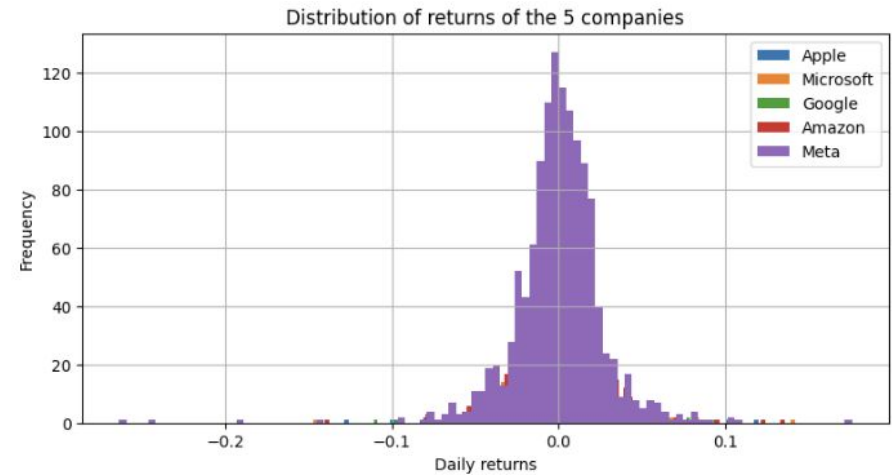
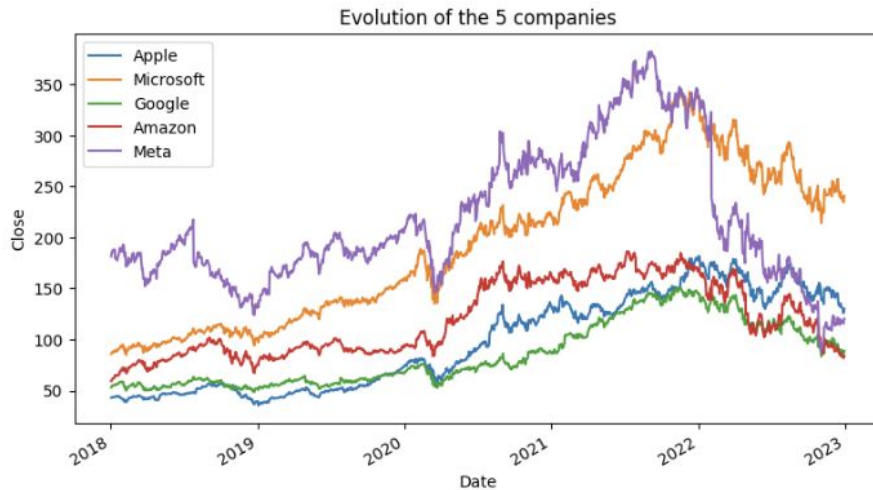
## Evolución y distribución de daily returns



# 3. Resultados

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## Evolución y distribución de daily returns





# 3. Resultados

## Bollinger Bands

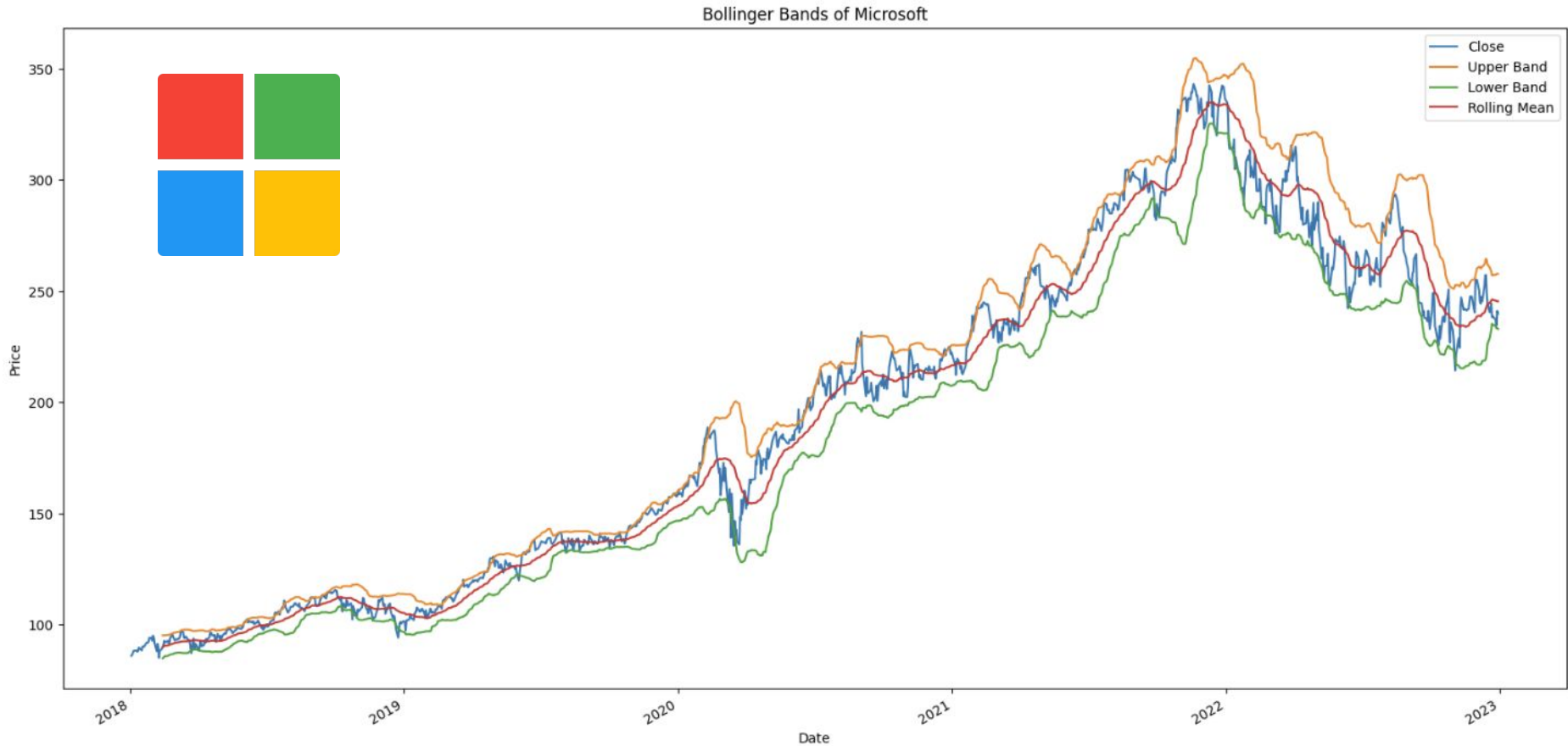
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# 3. Resultados

## Bollinger Bands

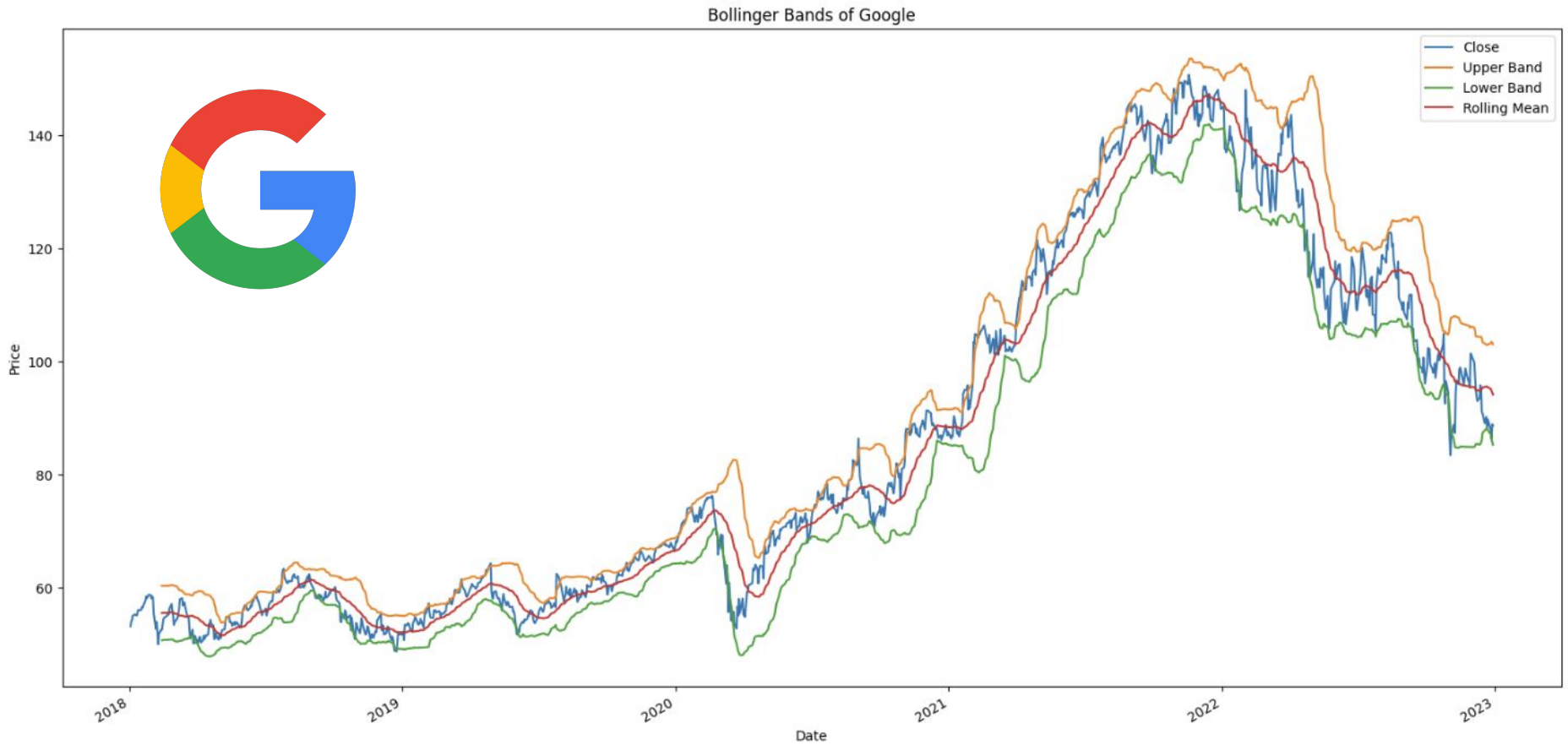
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# 3. Resultados

## Bollinger Bands

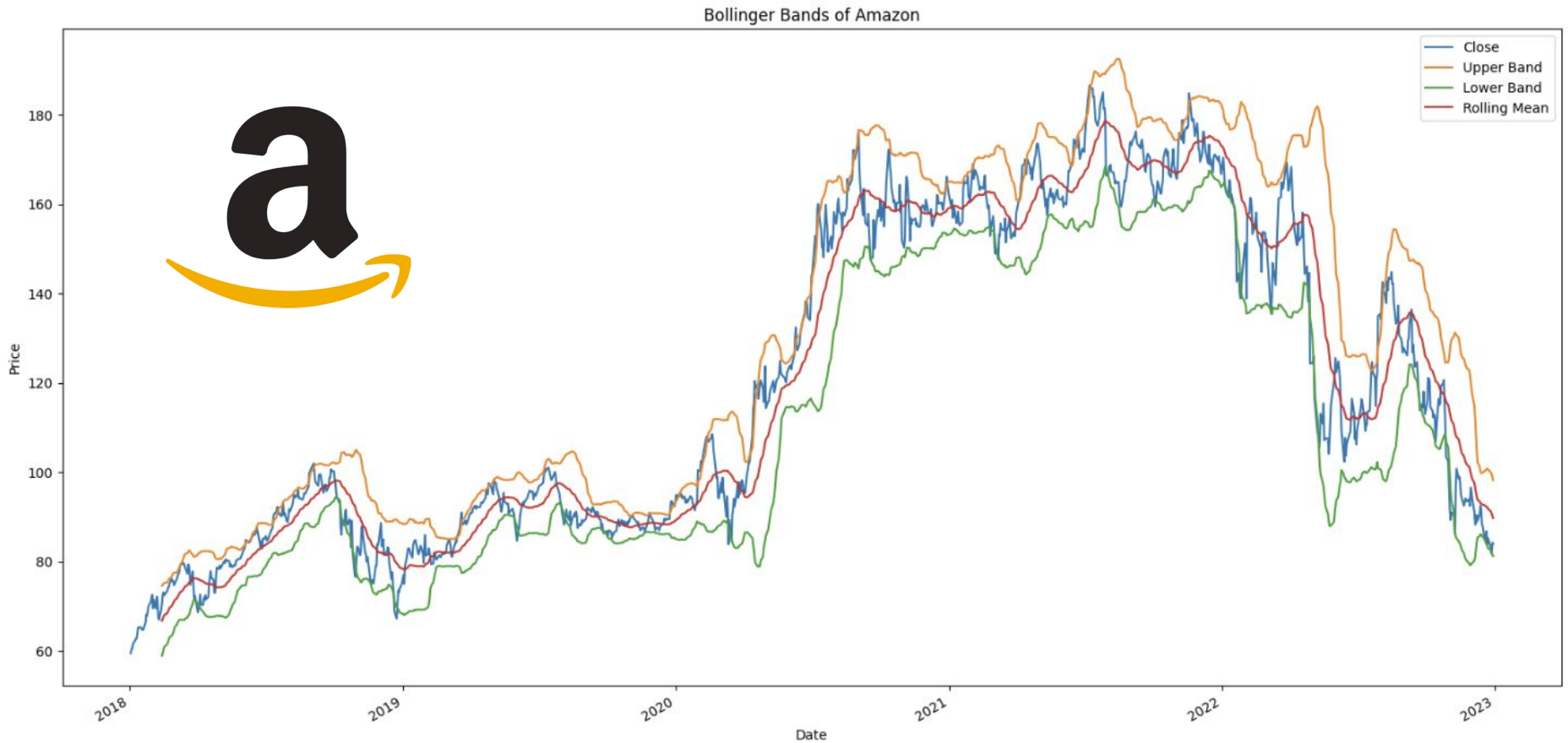
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# 3. Resultados

## Bollinger Bands

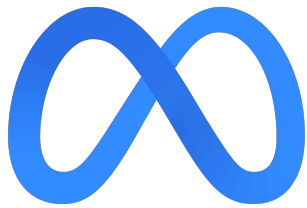
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# 3. Resultados

## Bollinger Bands

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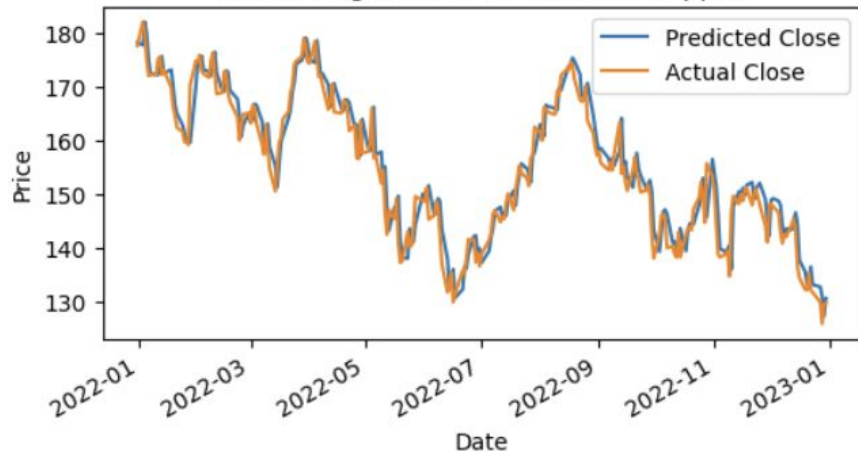


# 3. Resultados

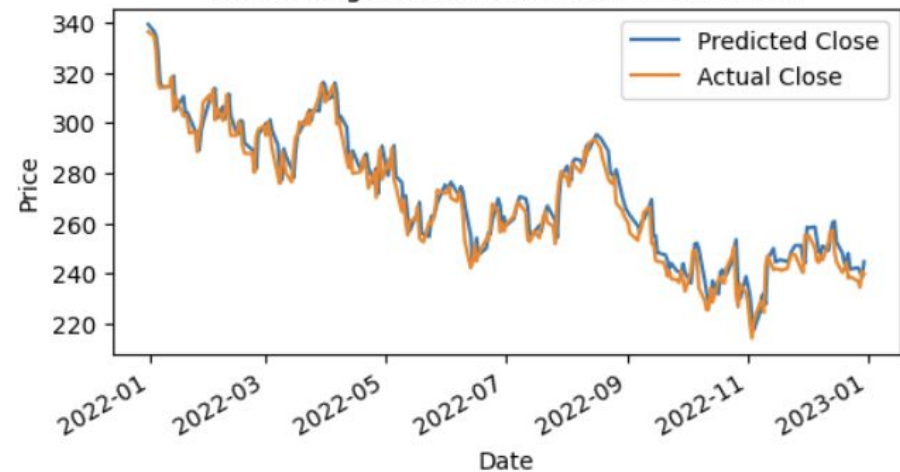
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## Predicción - Linear Regression

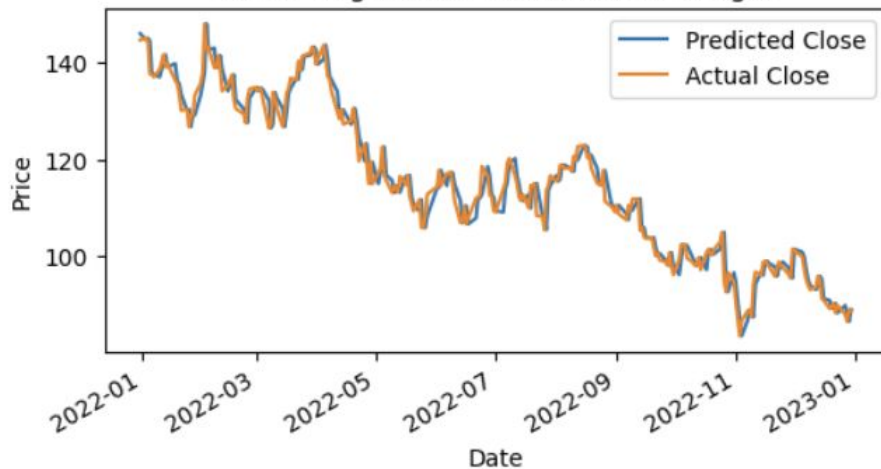
Linear Regression Predictions of Apple



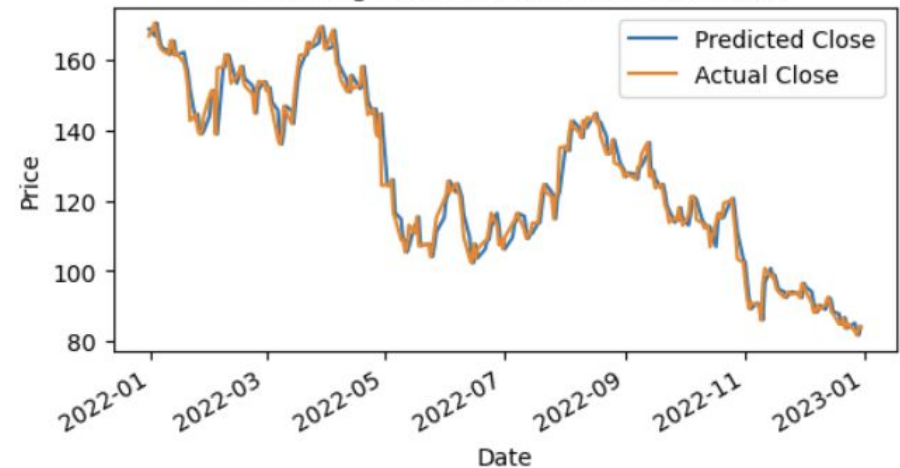
Linear Regression Predictions of Microsoft



Linear Regression Predictions of Google



Linear Regression Predictions of Amazon

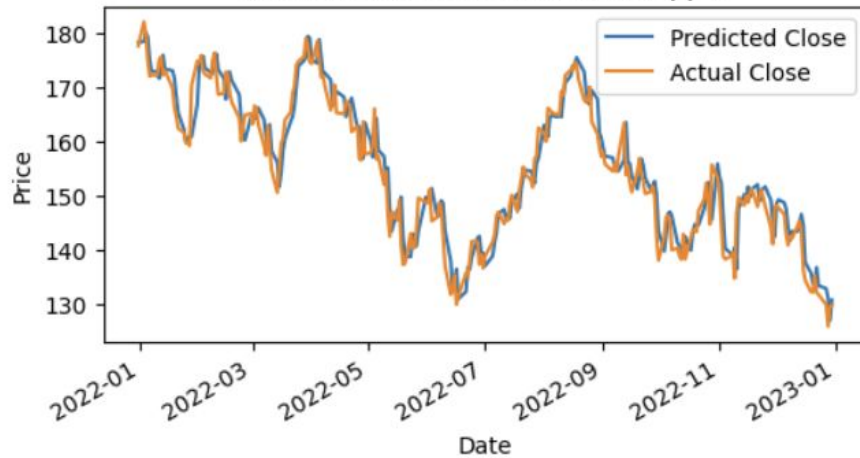


# 3. Resultados

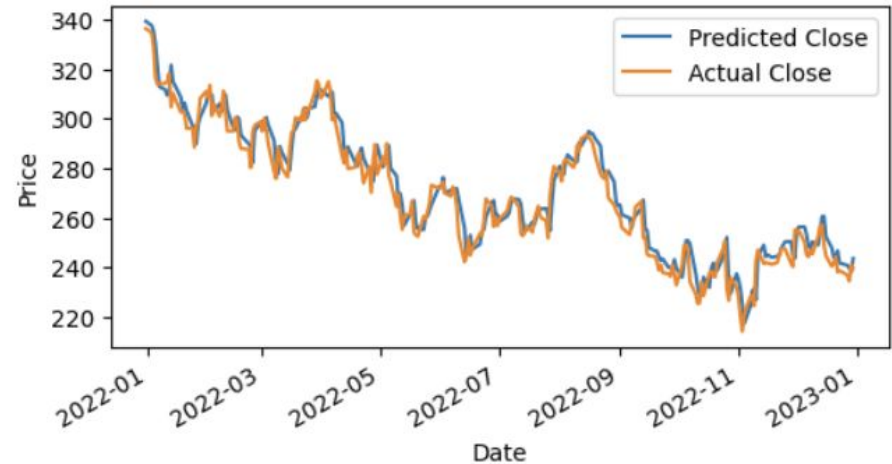
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## Predicción - Random Forest

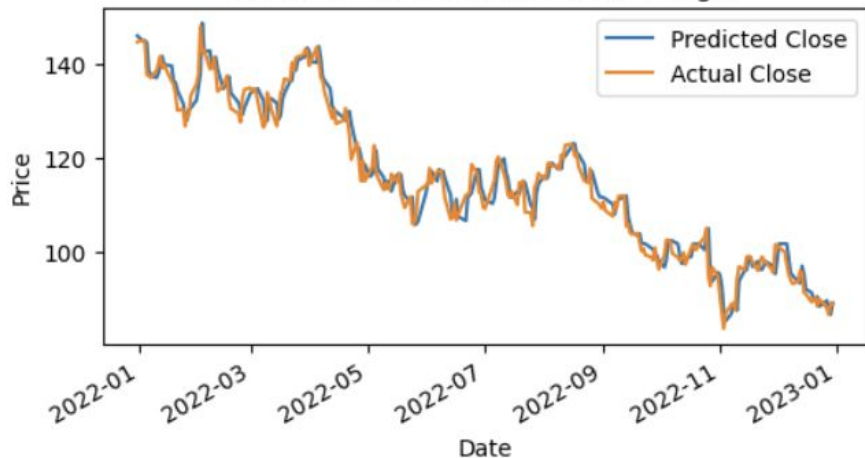
Random Forest Predictions of Apple



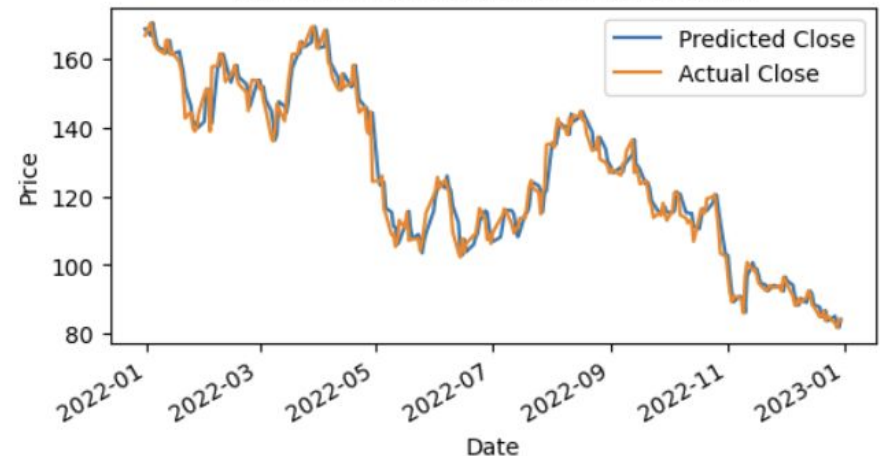
Random Forest Predictions of Microsoft



Random Forest Predictions of Google



Random Forest Predictions of Amazon



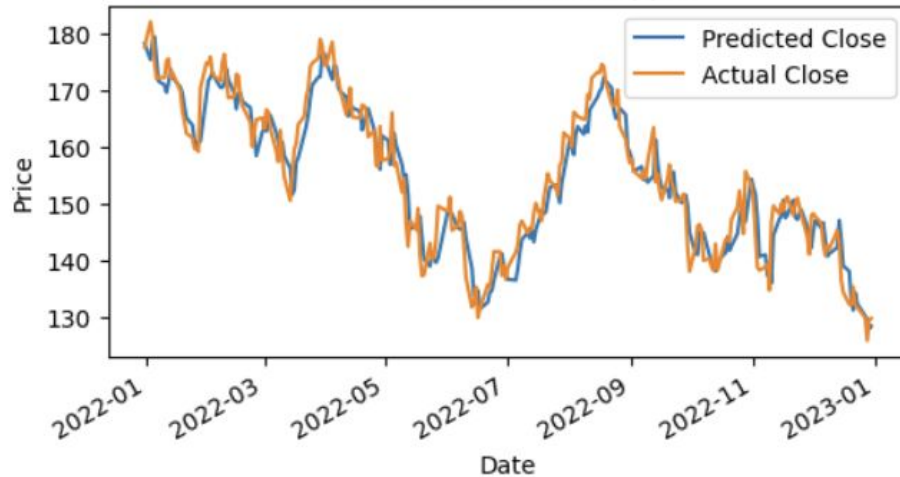


# 3. Resultados

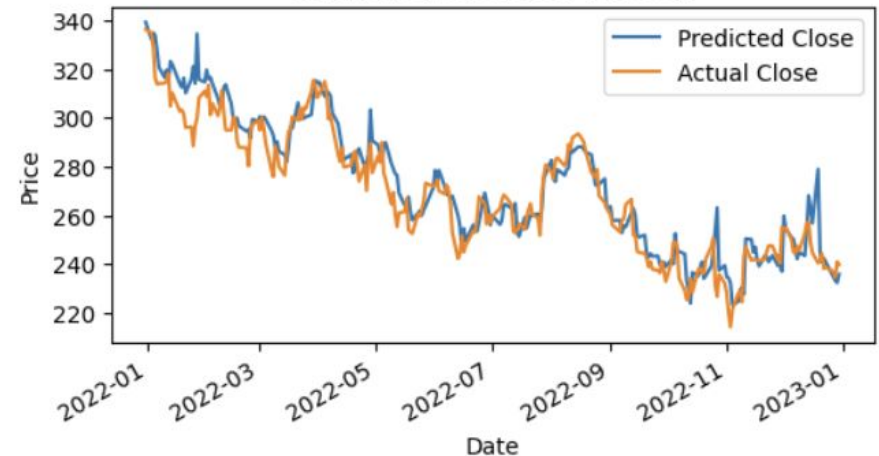
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## Predicción - Long short-term memory

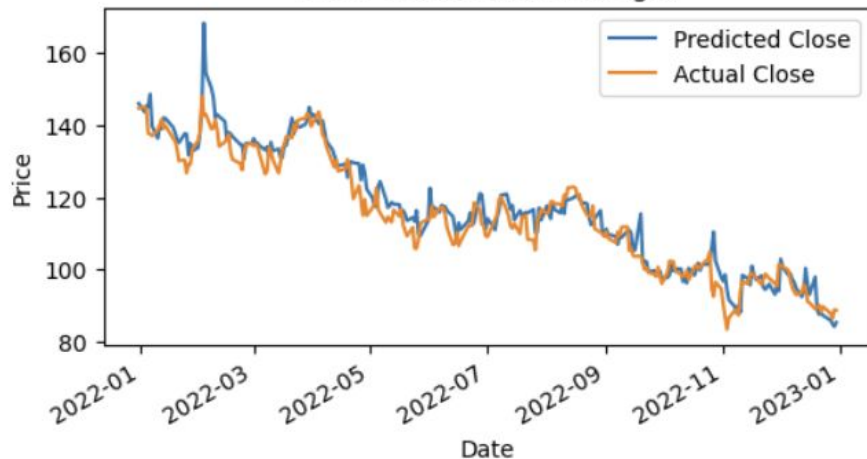
LSTM Predictions of Apple



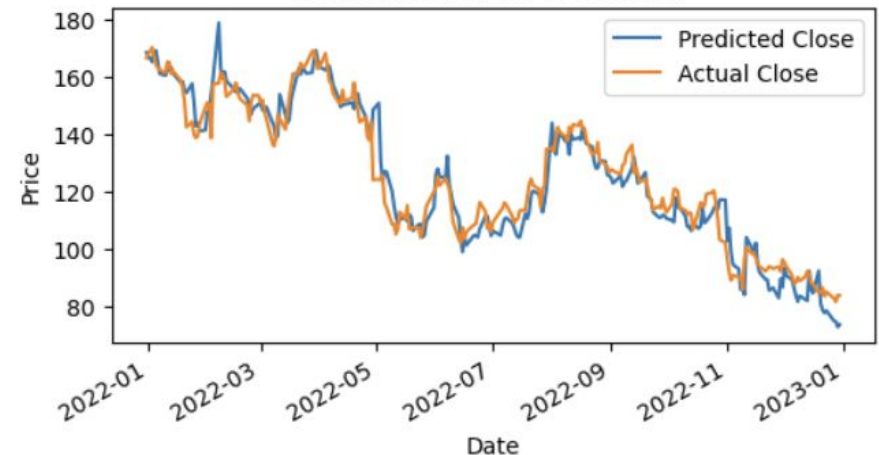
LSTM Predictions of Microsoft



LSTM Predictions of Google



LSTM Predictions of Amazon

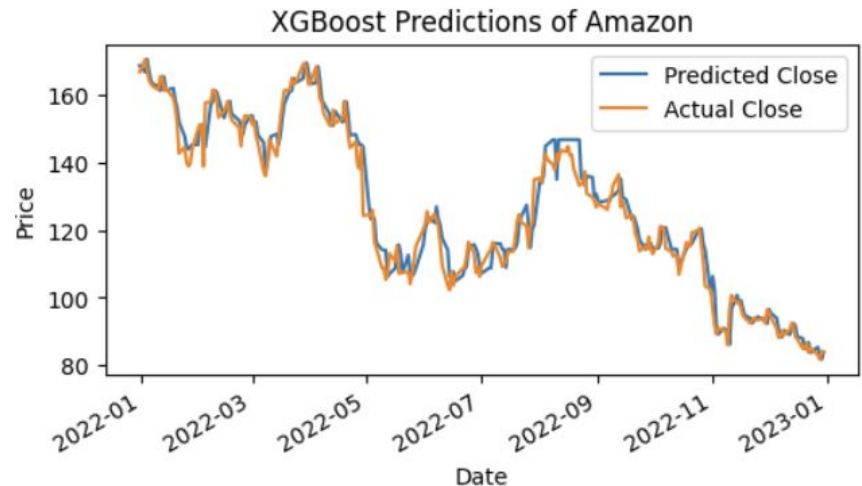
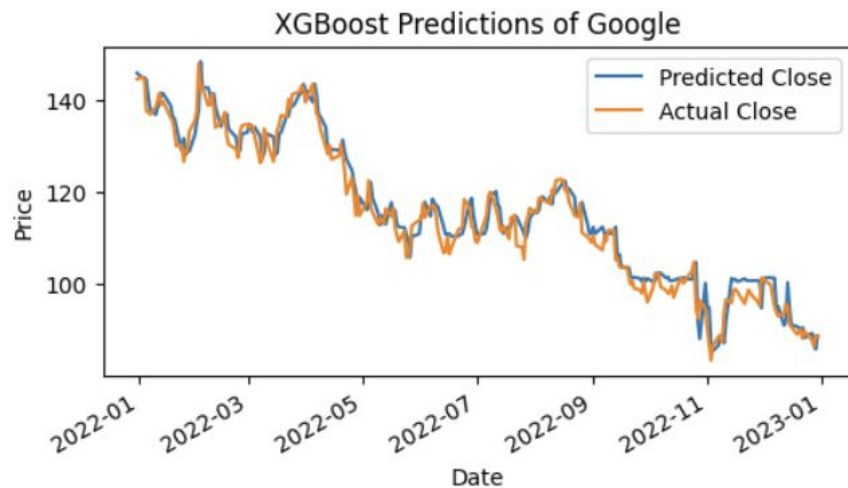
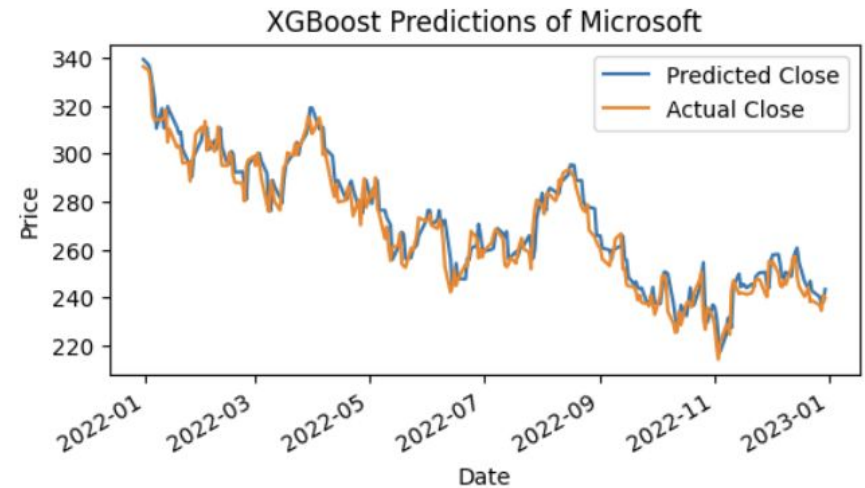
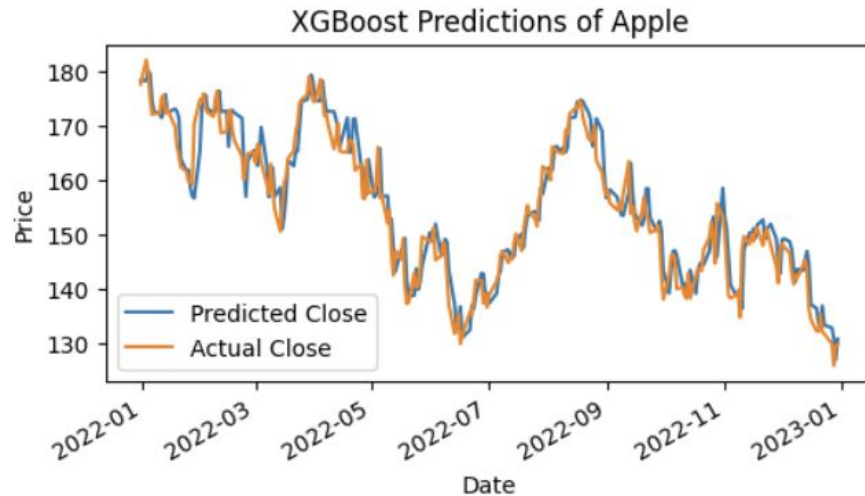




# 3. Resultados

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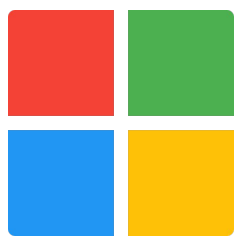
## Predicción - XGBoost



# 3. Resultados

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## Evaluación



Linear  
Regression

RMSE: 4,62

Random  
Forest

RMSE: 5,59

Linear  
Regression

RMSE: 3,06

Linear  
Regression

RMSE: 4,48

Linear  
Regression

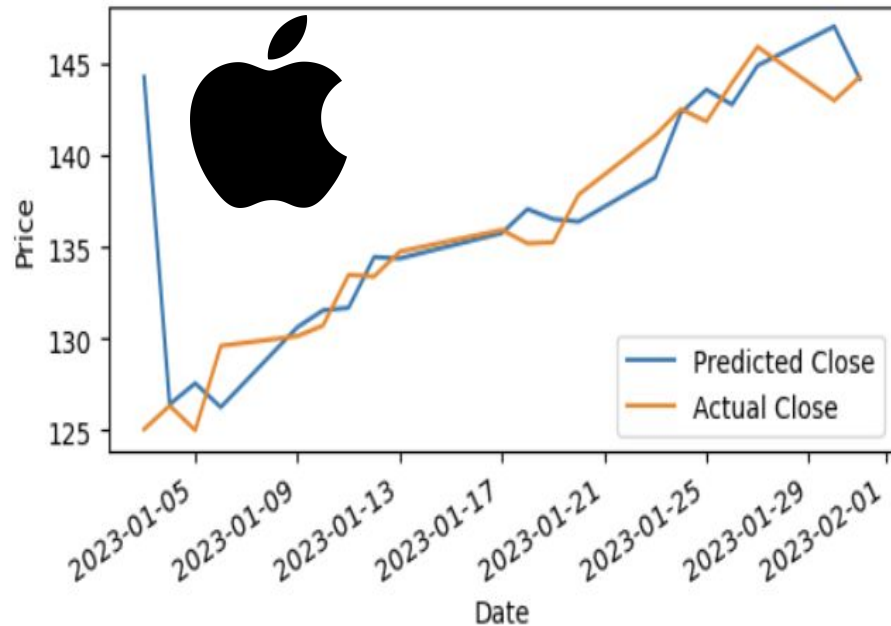
RMSE: 6,15

# 3. Resultados

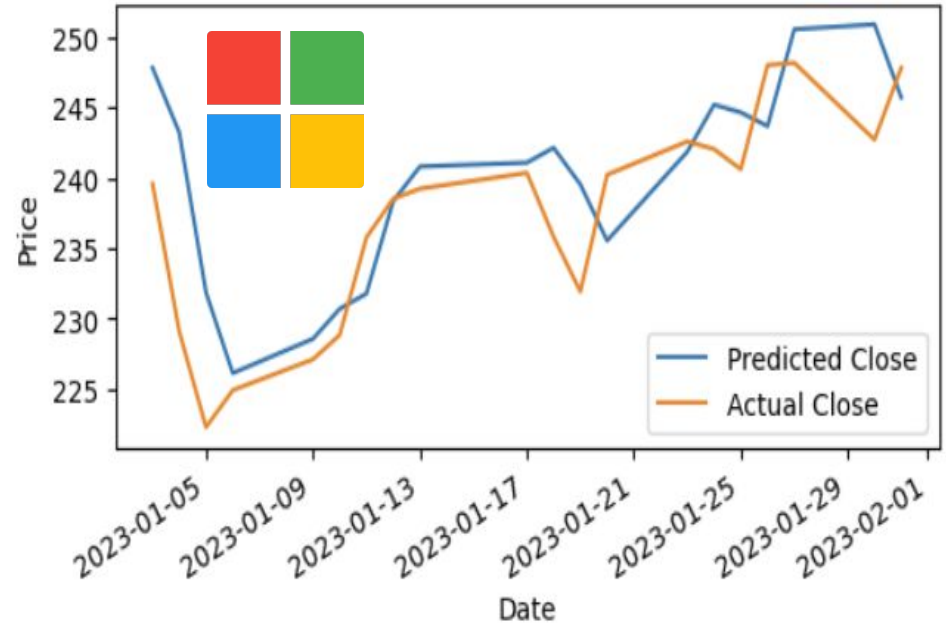
## Predicciones

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Future Predictions for Jan 2023 Apple Stock Price



Future Predictions for Jan 2023 Microsoft Stock Price

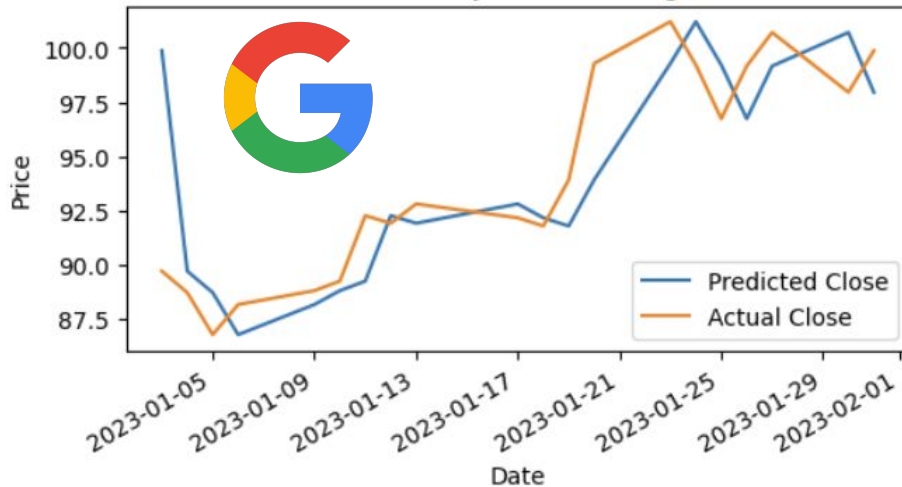


# 3. Resultados

## Predicciones

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Future Predictions for Jan 2023 Google Stock Price



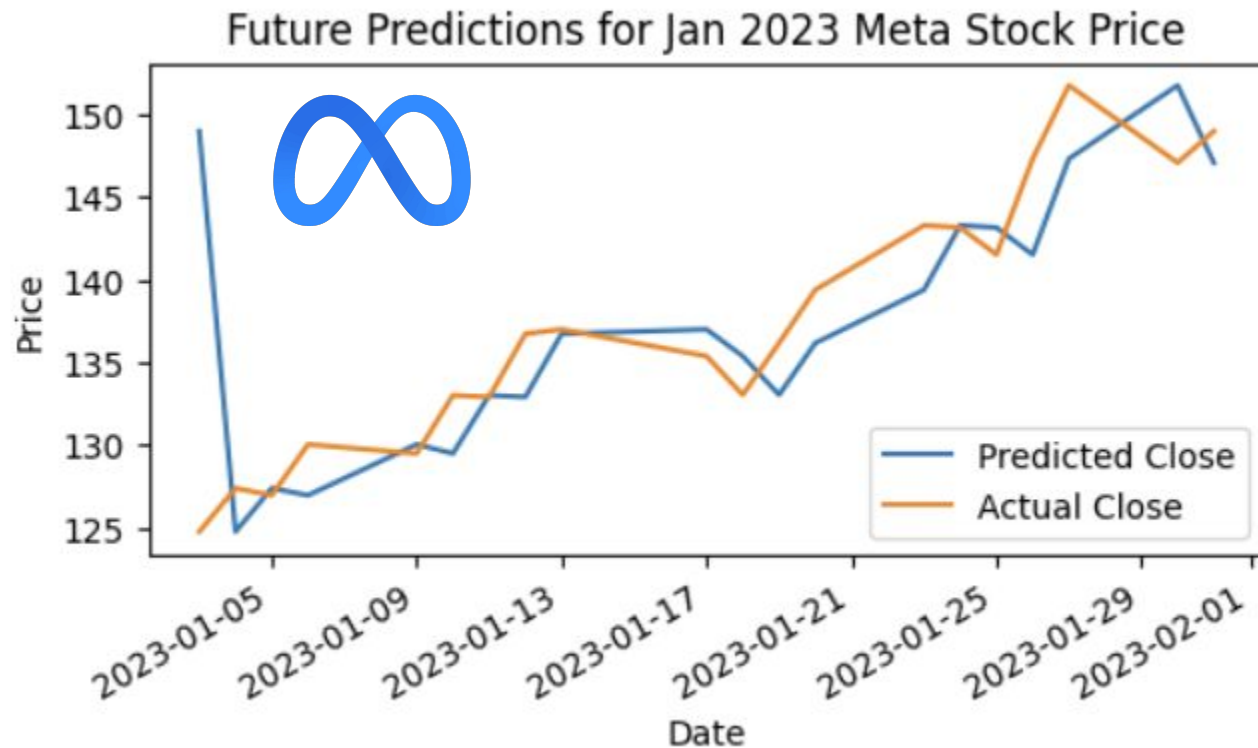
Future Predictions for Jan 2023 Amazon Stock Price



# 3. Resultados

## Predicciones

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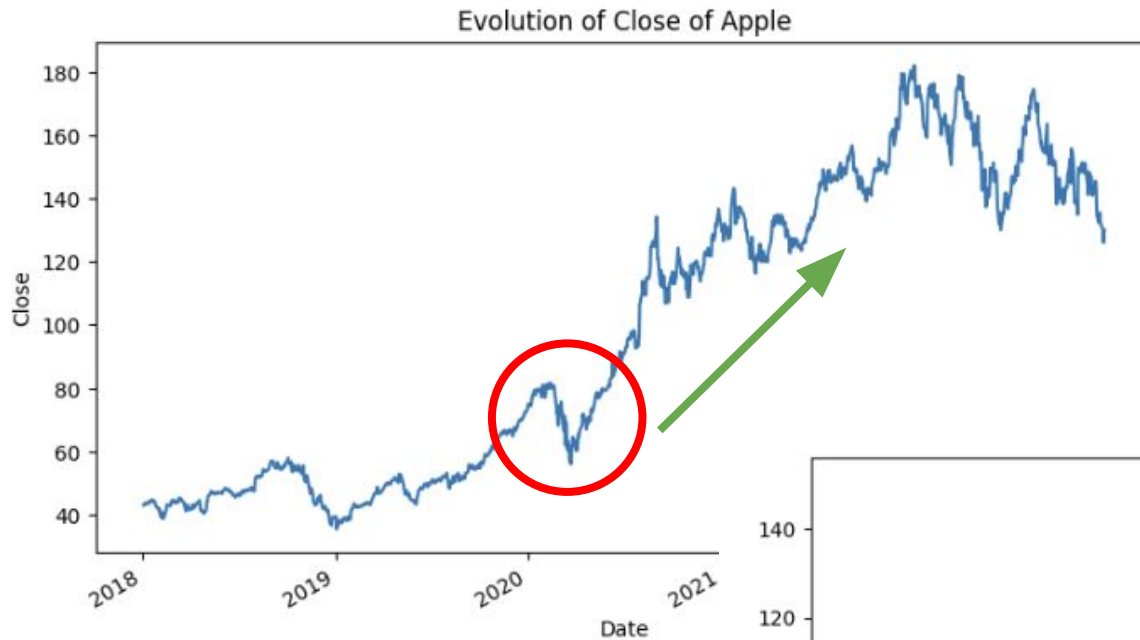
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# 4. Conclusiones

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## Pandemia y tendencia alta



# 4. Conclusiones

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Predicción

Datos y análisis



Aleatoriedad

Mercado Bursátil



# Máster en Ingeniería del Software: Cloud, Datos y Gestión TI

## Machine Learning Engineering (MLE)

**Investigating different stock market prices and making predictions through the application of ML techniques**

