

# Stock Market Prediction UBER

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2023-08-17

# GROUP - 09

## # Abbas Ali Code for Linear Regression on the Data

### Linear Regression

```
library(dplyr)

##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##   filter, lag

## The following objects are masked from 'package:base':
##
##   intersect, setdiff, setequal, union

install.packages('caret')

## Installing package into '/cloud/lib/x86_64-pc-linux-gnu-library/4.3'
## (as 'lib' is unspecified)

library(caret)

## Loading required package: ggplot2

## Loading required package: lattice

uber <- read.csv('UBER-PRE.csv')

#Split the data into training and testing sets
set.seed(123) # for reproducibility
train_index <- createDataPartition(uber$Close, p = 0.8, list = FALSE)
train_data <- uber[train_index, ]
test_data <- uber[-train_index, ]

# The linear regression model
model <- lm(Close ~ Open + High + Low + Adj_Close + Volume, data =
train_data)

# Printing Model Summary
summary(model)
```

```
##
## Call:
## lm(formula = Close ~ Open + High + Low + Adj_Close + Volume,
##     data = train_data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.0049822 -0.0004571 -0.0000035  0.0005088  0.0045399
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  6.795e-04  6.400e-05  10.618 < 2e-16 ***
## Open        -4.521e-02  6.456e-03  -7.004 3.67e-12 ***
## High         6.778e-02  6.880e-03   9.853 < 2e-16 ***
## Low          3.236e-02  6.393e-03   5.062 4.63e-07 ***
## Adj_Close    9.402e-01  6.381e-03 147.348 < 2e-16 ***
## Volume       1.225e-12  3.109e-13   3.941 8.48e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.001332 on 1596 degrees of freedom
## Multiple R-squared:  1, Adjusted R-squared:  1
## F-statistic: 9.899e+06 on 5 and 1596 DF, p-value: < 2.2e-16

# Predicting on the data used
predictions <- predict(model, newdata = test_data)

# Calculate the Mean Squared Error
mse <- mean((test_data$Close - predictions)^2)
# Calculates R-squared for model evaluation
r_squared <- cor(test_data$Close, predictions)^2

# Let's predict the future 'Close' using the model
cat("Mean Squared Error:", mse, "\n")

## Mean Squared Error: 1.736988e-06

cat("R-squared:", r_squared, "\n")

## R-squared: 0.9999673

future_features <- data.frame(Open = c(200), High = c(220), Low = c(190),
Adj_Close = c(210), Volume = c(150000))
future_close <- predict(model, newdata = future_features)
cat("Predicted Future Close:", future_close, "\n")

## Predicted Future Close: 209.4572

output_df <- data.frame(Date = test_data$Date, Actual_Close =
test_data$Close, Predicted_Close = predictions)
print(output_df)
```

| ##     | Date       | Actual_Close | Predicted_Close |
|--------|------------|--------------|-----------------|
| ## 2   | 15-12-1980 | 0.15116344   | 0.15096144      |
| ## 4   | 17-12-1980 | 0.13837149   | 0.13820418      |
| ## 24  | 16-01-1981 | 0.18604700   | 0.18539341      |
| ## 26  | 20-01-1981 | 0.19418601   | 0.19349200      |
| ## 41  | 10-02-1981 | 0.15116344   | 0.15082079      |
| ## 43  | 12-02-1981 | 0.14069692   | 0.14037216      |
| ## 45  | 17-02-1981 | 0.14069692   | 0.14042184      |
| ## 51  | 25-02-1981 | 0.13255791   | 0.13235240      |
| ## 55  | 03-03-1981 | 0.14186172   | 0.14153215      |
| ## 57  | 05-03-1981 | 0.13837149   | 0.13805246      |
| ## 59  | 09-03-1981 | 0.11744261   | 0.11728907      |
| ## 61  | 11-03-1981 | 0.09883708   | 0.09886288      |
| ## 62  | 12-03-1981 | 0.10697609   | 0.10700363      |
| ## 64  | 16-03-1981 | 0.11279175   | 0.11282969      |
| ## 69  | 23-03-1981 | 0.14651258   | 0.14628668      |
| ## 70  | 24-03-1981 | 0.14534987   | 0.14500818      |
| ## 92  | 24-04-1981 | 0.16744146   | 0.16697595      |
| ## 116 | 29-05-1981 | 0.20581316   | 0.20512491      |
| ## 128 | 16-06-1981 | 0.19302329   | 0.19234783      |
| ## 131 | 19-06-1981 | 0.17907070   | 0.17848551      |
| ## 135 | 25-06-1981 | 0.17209233   | 0.17160611      |
| ## 155 | 24-07-1981 | 0.12093076   | 0.12081939      |
| ## 163 | 05-08-1981 | 0.13837149   | 0.13811970      |
| ## 185 | 04-09-1981 | 0.08720992   | 0.08727471      |
| ## 187 | 09-09-1981 | 0.08139634   | 0.08157608      |
| ## 189 | 11-09-1981 | 0.08023363   | 0.08035232      |
| ## 198 | 24-09-1981 | 0.05000094   | 0.05034148      |
| ## 207 | 07-10-1981 | 0.06395352   | 0.06434759      |
| ## 208 | 08-10-1981 | 0.06976710   | 0.07003216      |
| ## 214 | 16-10-1981 | 0.06744167   | 0.06767546      |
| ## 216 | 20-10-1981 | 0.08023363   | 0.08042700      |
| ## 217 | 21-10-1981 | 0.08023363   | 0.08047744      |
| ## 219 | 23-10-1981 | 0.07441796   | 0.07459267      |
| ## 226 | 03-11-1981 | 0.08139634   | 0.08152106      |
| ## 228 | 05-11-1981 | 0.06395352   | 0.06419806      |
| ## 230 | 09-11-1981 | 0.06744167   | 0.06770814      |
| ## 232 | 11-11-1981 | 0.07325525   | 0.07348903      |
| ## 235 | 16-11-1981 | 0.06395352   | 0.06419707      |
| ## 238 | 19-11-1981 | 0.07325525   | 0.07350443      |
| ## 241 | 24-11-1981 | 0.06511624   | 0.06534953      |
| ## 249 | 07-12-1981 | 0.07558068   | 0.07583660      |
| ## 258 | 18-12-1981 | 0.11046632   | 0.11048538      |
| ## 261 | 23-12-1981 | 0.09999979   | 0.09998886      |
| ## 265 | 30-12-1981 | 0.10348794   | 0.10350913      |
| ## 266 | 31-12-1981 | 0.10348794   | 0.10353666      |
| ## 272 | 11-01-1982 | 0.07092982   | 0.07113547      |
| ## 276 | 15-01-1982 | 0.08372177   | 0.08398247      |
| ## 278 | 19-01-1982 | 0.08255906   | 0.08273303      |
| ## 300 | 19-02-1982 | 0.07209253   | 0.07226673      |

|        |            |            |            |
|--------|------------|------------|------------|
| ## 301 | 22-02-1982 | 0.06976710 | 0.06997431 |
| ## 303 | 24-02-1982 | 0.06860439 | 0.06888511 |
| ## 308 | 03-03-1982 | 0.06860439 | 0.06886760 |
| ## 309 | 04-03-1982 | 0.06511624 | 0.06536940 |
| ## 310 | 05-03-1982 | 0.05232637 | 0.05268297 |
| ## 315 | 12-03-1982 | 0.03953441 | 0.03998443 |
| ## 316 | 15-03-1982 | 0.03837170 | 0.03883488 |
| ## 319 | 18-03-1982 | 0.03953441 | 0.04004881 |
| ## 321 | 22-03-1982 | 0.06395352 | 0.06430661 |
| ## 326 | 29-03-1982 | 0.05232637 | 0.05276267 |
| ## 327 | 30-03-1982 | 0.05465180 | 0.05508375 |
| ## 333 | 07-04-1982 | 0.05930266 | 0.05958829 |
| ## 348 | 29-04-1982 | 0.03372084 | 0.03430830 |
| ## 358 | 13-05-1982 | 0.03953441 | 0.04004651 |
| ## 359 | 14-05-1982 | 0.03372084 | 0.03429825 |
| ## 360 | 17-05-1982 | 0.03139540 | 0.03194013 |
| ## 365 | 24-05-1982 | 0.03139540 | 0.03193834 |
| ## 369 | 28-05-1982 | 0.02790726 | 0.02846132 |
| ## 381 | 16-06-1982 | 0.02209368 | 0.02271669 |
| ## 384 | 21-06-1982 | 0.01744282 | 0.01808373 |
| ## 385 | 22-06-1982 | 0.02209368 | 0.02276525 |
| ## 390 | 29-06-1982 | 0.01628010 | 0.01688481 |
| ## 405 | 21-07-1982 | 0.03023269 | 0.03083406 |
| ## 407 | 23-07-1982 | 0.02906997 | 0.02956078 |
| ## 411 | 29-07-1982 | 0.02209368 | 0.02274137 |
| ## 414 | 03-08-1982 | 0.01860553 | 0.01925944 |
| ## 418 | 09-08-1982 | 0.01279196 | 0.01350072 |
| ## 436 | 02-09-1982 | 0.06744167 | 0.06777558 |
| ## 448 | 21-09-1982 | 0.06744167 | 0.06772810 |
| ## 451 | 24-09-1982 | 0.06627896 | 0.06669617 |
| ## 453 | 28-09-1982 | 0.06860439 | 0.06902159 |
| ## 465 | 14-10-1982 | 0.11744261 | 0.11751735 |
| ## 466 | 15-10-1982 | 0.11162903 | 0.11163644 |
| ## 479 | 03-11-1982 | 0.18372157 | 0.18356357 |
| ## 481 | 05-11-1982 | 0.17790799 | 0.17741801 |
| ## 482 | 08-11-1982 | 0.16627875 | 0.16624761 |
| ## 486 | 12-11-1982 | 0.19883687 | 0.19896380 |
| ## 488 | 16-11-1982 | 0.17674527 | 0.17671540 |
| ## 503 | 08-12-1982 | 0.20581316 | 0.20585296 |
| ## 505 | 10-12-1982 | 0.16976689 | 0.16964002 |
| ## 506 | 13-12-1982 | 0.16395332 | 0.16361181 |
| ## 509 | 16-12-1982 | 0.16511603 | 0.16503352 |
| ## 523 | 06-01-1983 | 0.16860418 | 0.16842582 |
| ## 524 | 07-01-1983 | 0.15348888 | 0.15380915 |
| ## 530 | 17-01-1983 | 0.21511697 | 0.21485630 |
| ## 531 | 18-01-1983 | 0.20814068 | 0.20790696 |
| ## 532 | 19-01-1983 | 0.21046611 | 0.21002433 |
| ## 534 | 21-01-1983 | 0.24534966 | 0.24561532 |
| ## 538 | 27-01-1983 | 0.27674506 | 0.27592440 |
| ## 539 | 28-01-1983 | 0.27907049 | 0.27876267 |

|        |            |            |            |
|--------|------------|------------|------------|
| ## 540 | 31-01-1983 | 0.27790778 | 0.27695924 |
| ## 544 | 04-02-1983 | 0.30697775 | 0.30622528 |
| ## 546 | 08-02-1983 | 0.28720950 | 0.28629751 |
| ## 548 | 10-02-1983 | 0.31627948 | 0.31538439 |
| ## 551 | 15-02-1983 | 0.31976762 | 0.31850213 |
| ## 557 | 24-02-1983 | 0.34534945 | 0.34388940 |
| ## 558 | 25-02-1983 | 0.33255750 | 0.33145776 |
| ## 560 | 01-03-1983 | 0.32906935 | 0.32770597 |
| ## 566 | 09-03-1983 | 0.30348752 | 0.30208822 |
| ## 573 | 18-03-1983 | 0.29767394 | 0.29661508 |
| ## 581 | 30-03-1983 | 0.30930318 | 0.30795223 |
| ## 586 | 07-04-1983 | 0.26627854 | 0.26533464 |
| ## 591 | 14-04-1983 | 0.31627948 | 0.31487547 |
| ## 595 | 20-04-1983 | 0.36860376 | 0.36762176 |
| ## 596 | 21-04-1983 | 0.38139572 | 0.38011532 |
| ## 599 | 26-04-1983 | 0.36279018 | 0.36143451 |
| ## 606 | 05-05-1983 | 0.40814026 | 0.40645250 |
| ## 607 | 06-05-1983 | 0.41046569 | 0.40833366 |
| ## 613 | 16-05-1983 | 0.37907029 | 0.37726493 |
| ## 615 | 18-05-1983 | 0.38604658 | 0.38447257 |
| ## 616 | 19-05-1983 | 0.40116188 | 0.39924722 |
| ## 622 | 27-05-1983 | 0.45000010 | 0.44777183 |
| ## 626 | 03-06-1983 | 0.46860564 | 0.46640893 |
| ## 629 | 08-06-1983 | 0.45465097 | 0.45226501 |
| ## 634 | 15-06-1983 | 0.40348940 | 0.40141389 |
| ## 646 | 01-07-1983 | 0.35581389 | 0.35437220 |
| ## 647 | 05-07-1983 | 0.33721044 | 0.33597018 |
| ## 651 | 11-07-1983 | 0.33953587 | 0.33847029 |
| ## 656 | 18-07-1983 | 0.30930318 | 0.30760600 |
| ## 657 | 19-07-1983 | 0.30465232 | 0.30462063 |
| ## 660 | 22-07-1983 | 0.30465232 | 0.30331814 |
| ## 666 | 01-08-1983 | 0.21860512 | 0.21889430 |
| ## 668 | 03-08-1983 | 0.22209326 | 0.22165594 |
| ## 674 | 11-08-1983 | 0.21162882 | 0.21111775 |
| ## 677 | 16-08-1983 | 0.21279154 | 0.21223518 |
| ## 681 | 22-08-1983 | 0.21046611 | 0.20984206 |
| ## 689 | 01-09-1983 | 0.23604585 | 0.23594681 |
| ## 694 | 09-09-1983 | 0.18255885 | 0.18241955 |
| ## 696 | 13-09-1983 | 0.19534872 | 0.19522080 |
| ## 704 | 23-09-1983 | 0.12325619 | 0.12602265 |
| ## 706 | 27-09-1983 | 0.11627989 | 0.11680720 |
| ## 708 | 29-09-1983 | 0.10930360 | 0.11004462 |
| ## 709 | 30-09-1983 | 0.11279175 | 0.11304843 |
| ## 711 | 04-10-1983 | 0.11046632 | 0.11085274 |
| ## 713 | 06-10-1983 | 0.10465065 | 0.10496131 |
| ## 716 | 11-10-1983 | 0.07790820 | 0.07838442 |
| ## 720 | 17-10-1983 | 0.09302350 | 0.09359336 |
| ## 729 | 28-10-1983 | 0.09186078 | 0.09199964 |
| ## 730 | 31-10-1983 | 0.10813880 | 0.10861937 |
| ## 735 | 07-11-1983 | 0.09302350 | 0.09344996 |

|        |            |            |            |
|--------|------------|------------|------------|
| ## 738 | 10-11-1983 | 0.08023363 | 0.08093091 |
| ## 750 | 29-11-1983 | 0.09069807 | 0.09109772 |
| ## 751 | 30-11-1983 | 0.08720992 | 0.08754278 |
| ## 756 | 07-12-1983 | 0.09302350 | 0.09340175 |
| ## 762 | 15-12-1983 | 0.12441890 | 0.12490164 |
| ## 769 | 27-12-1983 | 0.12790705 | 0.12792175 |
| ## 776 | 06-01-1984 | 0.15581431 | 0.15572626 |
| ## 778 | 10-01-1984 | 0.15465159 | 0.15454548 |
| ## 781 | 13-01-1984 | 0.15116344 | 0.15107797 |
| ## 794 | 01-02-1984 | 0.12674433 | 0.12713412 |
| ## 796 | 03-02-1984 | 0.12558162 | 0.12597168 |
| ## 798 | 07-02-1984 | 0.12209347 | 0.12203105 |
| ## 800 | 09-02-1984 | 0.11744261 | 0.11769238 |
| ## 807 | 21-02-1984 | 0.14069692 | 0.14063863 |
| ## 814 | 01-03-1984 | 0.14883801 | 0.14854061 |
| ## 815 | 02-03-1984 | 0.15116344 | 0.15141221 |
| ## 828 | 21-03-1984 | 0.13953421 | 0.13958627 |
| ## 849 | 19-04-1984 | 0.16046517 | 0.16013306 |
| ## 850 | 23-04-1984 | 0.16162789 | 0.16187459 |
| ## 851 | 24-04-1984 | 0.15697702 | 0.15721455 |
| ## 866 | 15-05-1984 | 0.19418601 | 0.19370021 |
| ## 867 | 16-05-1984 | 0.18139613 | 0.18140498 |
| ## 868 | 17-05-1984 | 0.16860418 | 0.16854746 |
| ## 873 | 24-05-1984 | 0.17092961 | 0.17060538 |
| ## 874 | 25-05-1984 | 0.17209233 | 0.17181633 |
| ## 875 | 29-05-1984 | 0.17092961 | 0.17056170 |
| ## 876 | 30-05-1984 | 0.16744146 | 0.16711751 |
| ## 883 | 08-06-1984 | 0.16395332 | 0.16346154 |
| ## 885 | 12-06-1984 | 0.16860418 | 0.16842845 |
| ## 887 | 14-06-1984 | 0.16627875 | 0.16599154 |
| ## 890 | 19-06-1984 | 0.17092961 | 0.17106075 |
| ## 891 | 20-06-1984 | 0.17907070 | 0.17847476 |
| ## 896 | 27-06-1984 | 0.13255791 | 0.13271423 |
| ## 900 | 03-07-1984 | 0.13255791 | 0.13250919 |
| ## 908 | 16-07-1984 | 0.13720877 | 0.13701263 |
| ## 913 | 23-07-1984 | 0.13139520 | 0.13106817 |
| ## 914 | 24-07-1984 | 0.14534987 | 0.14552758 |
| ## 918 | 30-07-1984 | 0.13488334 | 0.13504803 |
| ## 927 | 10-08-1984 | 0.16279060 | 0.16367187 |
| ## 931 | 16-08-1984 | 0.15930245 | 0.15904583 |
| ## 934 | 21-08-1984 | 0.16279060 | 0.16276161 |
| ## 937 | 24-08-1984 | 0.15930245 | 0.15904477 |
| ## 950 | 13-09-1984 | 0.15348888 | 0.15336076 |
| ## 958 | 25-09-1984 | 0.14069692 | 0.14061027 |
| ## 961 | 28-09-1984 | 0.13139520 | 0.13135502 |
| ## 967 | 08-10-1984 | 0.12906977 | 0.12892223 |
| ## 968 | 09-10-1984 | 0.12674433 | 0.12676134 |
| ## 974 | 17-10-1984 | 0.12906977 | 0.12905661 |
| ## 982 | 29-10-1984 | 0.12790705 | 0.12777378 |
| ## 983 | 30-10-1984 | 0.13023248 | 0.13018970 |

|         |            |            |            |
|---------|------------|------------|------------|
| ## 990  | 08-11-1984 | 0.12790705 | 0.12794784 |
| ## 995  | 15-11-1984 | 0.11860532 | 0.11868443 |
| ## 1001 | 26-11-1984 | 0.12093076 | 0.12082917 |
| ## 1003 | 28-11-1984 | 0.13837149 | 0.13891413 |
| ## 1007 | 04-12-1984 | 0.12906977 | 0.12924671 |
| ## 1010 | 07-12-1984 | 0.15116344 | 0.15193859 |
| ## 1012 | 11-12-1984 | 0.14302444 | 0.14310307 |
| ## 1021 | 24-12-1984 | 0.15348888 | 0.15318946 |
| ## 1027 | 03-01-1985 | 0.16162789 | 0.16178239 |
| ## 1029 | 07-01-1985 | 0.16046517 | 0.16026711 |
| ## 1030 | 08-01-1985 | 0.15813974 | 0.15802618 |
| ## 1049 | 04-02-1985 | 0.16976689 | 0.16953513 |
| ## 1060 | 20-02-1985 | 0.14302444 | 0.14324510 |
| ## 1072 | 08-03-1985 | 0.09767436 | 0.09809624 |
| ## 1077 | 15-03-1985 | 0.10813880 | 0.10860053 |
| ## 1079 | 19-03-1985 | 0.10232522 | 0.10278307 |
| ## 1082 | 22-03-1985 | 0.10465065 | 0.10495498 |
| ## 1085 | 27-03-1985 | 0.10116251 | 0.10150500 |
| ## 1095 | 11-04-1985 | 0.09651164 | 0.09703693 |
| ## 1099 | 17-04-1985 | 0.10813880 | 0.10831582 |
| ## 1102 | 22-04-1985 | 0.09883708 | 0.09908095 |
| ## 1104 | 24-04-1985 | 0.10232522 | 0.10259311 |
| ## 1109 | 01-05-1985 | 0.09186078 | 0.09207284 |
| ## 1111 | 03-05-1985 | 0.08372177 | 0.08412291 |
| ## 1119 | 15-05-1985 | 0.08372177 | 0.08416324 |
| ## 1125 | 23-05-1985 | 0.08139634 | 0.08190828 |
| ## 1139 | 13-06-1985 | 0.03604627 | 0.03716155 |
| ## 1150 | 28-06-1985 | 0.06511624 | 0.06561847 |
| ## 1154 | 05-07-1985 | 0.06162809 | 0.06195825 |
| ## 1157 | 10-07-1985 | 0.06511624 | 0.06542653 |
| ## 1162 | 17-07-1985 | 0.06162809 | 0.06213641 |
| ## 1167 | 24-07-1985 | 0.04883822 | 0.04955248 |
| ## 1168 | 25-07-1985 | 0.05232637 | 0.05306591 |
| ## 1176 | 06-08-1985 | 0.03953441 | 0.04023936 |
| ## 1178 | 08-08-1985 | 0.03837170 | 0.03900540 |
| ## 1182 | 14-08-1985 | 0.03372084 | 0.03461353 |
| ## 1185 | 19-08-1985 | 0.03720898 | 0.03780822 |
| ## 1186 | 20-08-1985 | 0.03953441 | 0.03998365 |
| ## 1197 | 05-09-1985 | 0.03604627 | 0.03655615 |
| ## 1201 | 11-09-1985 | 0.04185984 | 0.04239490 |
| ## 1202 | 12-09-1985 | 0.04767551 | 0.04811858 |
| ## 1213 | 30-09-1985 | 0.04418736 | 0.04466989 |
| ## 1227 | 18-10-1985 | 0.06279081 | 0.06345188 |
| ## 1230 | 23-10-1985 | 0.06511624 | 0.06579111 |
| ## 1232 | 25-10-1985 | 0.06511624 | 0.06545150 |
| ## 1234 | 29-10-1985 | 0.06395352 | 0.06432981 |
| ## 1238 | 04-11-1985 | 0.07209253 | 0.07264963 |
| ## 1239 | 05-11-1985 | 0.07092982 | 0.07146093 |
| ## 1241 | 07-11-1985 | 0.08023363 | 0.08084999 |
| ## 1252 | 22-11-1985 | 0.07441796 | 0.07480824 |

|         |            |            |            |
|---------|------------|------------|------------|
| ## 1253 | 25-11-1985 | 0.07558068 | 0.07589672 |
| ## 1254 | 26-11-1985 | 0.07790820 | 0.07826502 |
| ## 1259 | 04-12-1985 | 0.08837264 | 0.08870722 |
| ## 1260 | 05-12-1985 | 0.08488449 | 0.08527020 |
| ## 1268 | 17-12-1985 | 0.08953535 | 0.08972462 |
| ## 1273 | 24-12-1985 | 0.09999979 | 0.10007209 |
| ## 1276 | 30-12-1985 | 0.10465065 | 0.10481984 |
| ## 1279 | 03-01-1986 | 0.10581337 | 0.10597162 |
| ## 1280 | 06-01-1986 | 0.10465065 | 0.10468087 |
| ## 1282 | 08-01-1986 | 0.11046632 | 0.11136362 |
| ## 1283 | 09-01-1986 | 0.10813880 | 0.10845389 |
| ## 1285 | 13-01-1986 | 0.11162903 | 0.11176429 |
| ## 1287 | 15-01-1986 | 0.11976804 | 0.12017968 |
| ## 1290 | 20-01-1986 | 0.11976804 | 0.11958000 |
| ## 1296 | 28-01-1986 | 0.10465065 | 0.10487000 |
| ## 1301 | 04-02-1986 | 0.11860532 | 0.11905476 |
| ## 1302 | 05-02-1986 | 0.11860532 | 0.11863981 |
| ## 1303 | 06-02-1986 | 0.12209347 | 0.12210629 |
| ## 1310 | 18-02-1986 | 0.11976804 | 0.11967143 |
| ## 1315 | 25-02-1986 | 0.14302444 | 0.14278979 |
| ## 1320 | 04-03-1986 | 0.12674433 | 0.12678311 |
| ## 1334 | 24-03-1986 | 0.14651258 | 0.14652838 |
| ## 1341 | 03-04-1986 | 0.14883801 | 0.14891778 |
| ## 1342 | 04-04-1986 | 0.14651258 | 0.14627055 |
| ## 1357 | 25-04-1986 | 0.19767415 | 0.19754341 |
| ## 1361 | 01-05-1986 | 0.17907070 | 0.17858725 |
| ## 1368 | 12-05-1986 | 0.23604585 | 0.23592481 |
| ## 1371 | 15-05-1986 | 0.23255770 | 0.23193959 |
| ## 1376 | 22-05-1986 | 0.23953608 | 0.23877685 |
| ## 1381 | 30-05-1986 | 0.24186151 | 0.24091809 |
| ## 1383 | 03-06-1986 | 0.25000052 | 0.24947890 |
| ## 1400 | 26-06-1986 | 0.23488313 | 0.23397905 |
| ## 1403 | 01-07-1986 | 0.22674413 | 0.22592550 |
| ## 1415 | 18-07-1986 | 0.19302329 | 0.19275986 |
| ## 1420 | 25-07-1986 | 0.21395425 | 0.21337815 |
| ## 1424 | 31-07-1986 | 0.18837243 | 0.18824389 |
| ## 1430 | 08-08-1986 | 0.19186057 | 0.19162020 |
| ## 1435 | 15-08-1986 | 0.23023227 | 0.22965715 |
| ## 1442 | 26-08-1986 | 0.23837128 | 0.23764119 |
| ## 1445 | 29-08-1986 | 0.24186151 | 0.24125095 |
| ## 1452 | 10-09-1986 | 0.22325598 | 0.22259129 |
| ## 1458 | 18-09-1986 | 0.21395425 | 0.21330646 |
| ## 1460 | 22-09-1986 | 0.22558141 | 0.22516251 |
| ## 1465 | 29-09-1986 | 0.19999958 | 0.19957519 |
| ## 1466 | 30-09-1986 | 0.20930339 | 0.20888489 |
| ## 1470 | 06-10-1986 | 0.21511697 | 0.21440636 |
| ## 1472 | 08-10-1986 | 0.20232501 | 0.20159585 |
| ## 1473 | 09-10-1986 | 0.20465045 | 0.20405906 |
| ## 1477 | 15-10-1986 | 0.20814068 | 0.20736873 |
| ## 1478 | 16-10-1986 | 0.21046611 | 0.20990462 |



|         |            |            |            |
|---------|------------|------------|------------|
| ## 1496 | 11-11-1986 | 0.22790684 | 0.22704790 |
| ## 1502 | 19-11-1986 | 0.22325598 | 0.22261036 |
| ## 1503 | 20-11-1986 | 0.22558141 | 0.22508060 |
| ## 1506 | 25-11-1986 | 0.27209420 | 0.27213699 |
| ## 1508 | 28-11-1986 | 0.26976669 | 0.26879925 |
| ## 1516 | 10-12-1986 | 0.30232481 | 0.30124662 |
| ## 1522 | 18-12-1986 | 0.28255864 | 0.28159975 |
| ## 1531 | 02-01-1987 | 0.27790778 | 0.27682621 |
| ## 1536 | 09-01-1987 | 0.31976762 | 0.31858128 |
| ## 1537 | 12-01-1987 | 0.32093034 | 0.31946578 |
| ## 1539 | 14-01-1987 | 0.34534945 | 0.34453593 |
| ## 1542 | 19-01-1987 | 0.39186016 | 0.39032396 |
| ## 1545 | 22-01-1987 | 0.38604658 | 0.38483710 |
| ## 1548 | 27-01-1987 | 0.38837201 | 0.38716820 |
| ## 1551 | 30-01-1987 | 0.41395384 | 0.41207773 |
| ## 1554 | 04-02-1987 | 0.40930297 | 0.40716220 |
| ## 1555 | 05-02-1987 | 0.39883645 | 0.39709179 |
| ## 1556 | 06-02-1987 | 0.39999917 | 0.39776065 |
| ## 1558 | 10-02-1987 | 0.38837201 | 0.38616826 |
| ## 1567 | 24-02-1987 | 0.50697734 | 0.50490792 |
| ## 1575 | 06-03-1987 | 0.52325535 | 0.52087750 |
| ## 1585 | 20-03-1987 | 0.53255916 | 0.53071223 |
| ## 1601 | 13-04-1987 | 0.52558078 | 0.52326731 |
| ## 1609 | 24-04-1987 | 0.59302246 | 0.59028302 |
| ## 1610 | 27-04-1987 | 0.59534789 | 0.59207880 |
| ## 1612 | 29-04-1987 | 0.62092971 | 0.61866311 |
| ## 1618 | 07-05-1987 | 0.64418611 | 0.64090990 |
| ## 1620 | 11-05-1987 | 0.61395342 | 0.61290171 |
| ## 1626 | 19-05-1987 | 0.57906987 | 0.57710857 |
| ## 1629 | 22-05-1987 | 0.58720888 | 0.58508197 |
| ## 1643 | 12-06-1987 | 0.63255895 | 0.63018735 |
| ## 1647 | 18-06-1987 | 0.66976794 | 0.66706630 |
| ## 1649 | 22-06-1987 | 0.67906966 | 0.67636096 |
| ## 1654 | 29-06-1987 | 0.65581327 | 0.65265923 |
| ## 1659 | 07-07-1987 | 0.62790601 | 0.62612548 |
| ## 1669 | 21-07-1987 | 0.66744250 | 0.66529153 |
| ## 1674 | 28-07-1987 | 0.67674423 | 0.67418245 |
| ## 1678 | 03-08-1987 | 0.64651154 | 0.64455408 |
| ## 1682 | 07-08-1987 | 0.76279143 | 0.76016909 |
| ## 1683 | 10-08-1987 | 0.79534955 | 0.79114778 |
| ## 1684 | 11-08-1987 | 0.81860387 | 0.81655299 |
| ## 1686 | 13-08-1987 | 0.80930214 | 0.80819223 |
| ## 1687 | 14-08-1987 | 0.80930214 | 0.80766768 |
| ## 1689 | 18-08-1987 | 0.80465128 | 0.80235948 |
| ## 1692 | 21-08-1987 | 0.88372011 | 0.88179117 |
| ## 1693 | 24-08-1987 | 0.86976752 | 0.86775791 |
| ## 1698 | 31-08-1987 | 0.90232564 | 0.89965253 |
| ## 1705 | 10-09-1987 | 0.89767478 | 0.89559486 |
| ## 1707 | 14-09-1987 | 0.88372011 | 0.88185583 |
| ## 1716 | 25-09-1987 | 0.96744188 | 0.96466326 |

|         |            |            |            |
|---------|------------|------------|------------|
| ## 1743 | 03-11-1987 | 0.57209358 | 0.57086880 |
| ## 1747 | 09-11-1987 | 0.59069703 | 0.58905379 |
| ## 1760 | 27-11-1987 | 0.54883718 | 0.54932296 |
| ## 1770 | 11-12-1987 | 0.53023165 | 0.53015221 |
| ## 1775 | 18-12-1987 | 0.65116240 | 0.65199571 |
| ## 1783 | 31-12-1987 | 0.67906966 | 0.67935742 |
| ## 1789 | 11-01-1988 | 0.68837139 | 0.68893815 |
| ## 1790 | 12-01-1988 | 0.67906966 | 0.67859482 |
| ## 1794 | 18-01-1988 | 0.69302225 | 0.69216924 |
| ## 1795 | 19-01-1988 | 0.69302225 | 0.69290618 |
| ## 1796 | 20-01-1988 | 0.63720982 | 0.63795398 |
| ## 1803 | 29-01-1988 | 0.66976794 | 0.66904652 |
| ## 1806 | 03-02-1988 | 0.63255895 | 0.63312224 |
| ## 1808 | 05-02-1988 | 0.61627885 | 0.61695016 |
| ## 1814 | 16-02-1988 | 0.66511707 | 0.66559453 |
| ## 1815 | 17-02-1988 | 0.67674423 | 0.67881959 |
| ## 1818 | 22-02-1988 | 0.70232606 | 0.70424972 |
| ## 1820 | 24-02-1988 | 0.68372052 | 0.68510220 |
| ## 1822 | 26-02-1988 | 0.67441880 | 0.67547043 |
| ## 1839 | 22-03-1988 | 0.71627864 | 0.71740181 |
| ## 1847 | 04-04-1988 | 0.61860428 | 0.62090704 |
| ## 1865 | 28-04-1988 | 0.66744250 | 0.66880462 |
| ## 1872 | 09-05-1988 | 0.65581327 | 0.65681603 |
| ## 1882 | 23-05-1988 | 0.60465170 | 0.60738025 |
| ## 1888 | 01-06-1988 | 0.68837139 | 0.69102800 |
| ## 1889 | 02-06-1988 | 0.67441880 | 0.67745165 |
| ## 1892 | 07-06-1988 | 0.71627864 | 0.72046627 |
| ## 1901 | 20-06-1988 | 0.71860407 | 0.72154083 |
| ## 1902 | 21-06-1988 | 0.73255875 | 0.73534214 |
| ## 1904 | 23-06-1988 | 0.73488418 | 0.73764552 |
| ## 1906 | 27-06-1988 | 0.72558037 | 0.72913189 |
| ## 1913 | 07-07-1988 | 0.75116219 | 0.75354777 |
| ## 1917 | 13-07-1988 | 0.73023331 | 0.73273837 |
| ## 1924 | 22-07-1988 | 0.68837139 | 0.69132888 |
| ## 1928 | 28-07-1988 | 0.69069682 | 0.69346629 |
| ## 1932 | 03-08-1988 | 0.73023331 | 0.73226554 |
| ## 1943 | 18-08-1988 | 0.68837139 | 0.69276226 |
| ## 1953 | 01-09-1988 | 0.62092971 | 0.62488314 |
| ## 1956 | 07-09-1988 | 0.60930256 | 0.61363722 |
| ## 1958 | 09-09-1988 | 0.65116240 | 0.65545084 |
| ## 1959 | 12-09-1988 | 0.66046413 | 0.66468045 |
| ## 1966 | 21-09-1988 | 0.69302225 | 0.69724702 |
| ## 1970 | 27-09-1988 | 0.70465149 | 0.70896799 |
| ## 1975 | 04-10-1988 | 0.66976794 | 0.67419991 |
| ## 1977 | 06-10-1988 | 0.63720982 | 0.64145538 |
| ## 1991 | 26-10-1988 | 0.62790601 | 0.63152600 |
| ## 1992 | 27-10-1988 | 0.62325515 | 0.62701922 |
| ## 1994 | 31-10-1988 | 0.61627885 | 0.61944006 |
| ## 1997 | 03-11-1988 | 0.58837159 | 0.59222812 |

## PLOTS

```
ggplot(output_df, aes(x = Actual_Close, y = Predicted_Close)) +  
  geom_point(aes(color = "Actual"), alpha = 0.5) + # Actual points with blue  
  color and transparency  
  geom_point(aes(color = "Predicted"), alpha = 0.5) + # Predicted points with  
  red color and transparency  
  geom_abline(intercept = 0, slope = 1, color = "black", linetype = "dotted")  
+  
  labs(title = "Actual vs. Predicted Close Prices", x = "Actual Close Price",  
y = "Predicted Close Price") +  
  scale_color_manual(values = c("Actual" = "green", "Predicted" = "red")) +  
  theme_minimal()
```



# Hardik Jain Code performed for the Random Forest for all data

## Random Forest

```
# The Libraries  
library(caret)  
install.packages('randomForest')  
  
## Installing package into '/cloud/lib/x86_64-pc-linux-gnu-library/4.3'  
## (as 'lib' is unspecified)  
  
library(randomForest)  
  
## randomForest 4.7-1.1
```

```

## Type rfNews() to see new features/changes/bug fixes.

##
## Attaching package: 'randomForest'

## The following object is masked from 'package:ggplot2':
##
##     margin

## The following object is masked from 'package:dplyr':
##
##     combine

# The Data-Set
uber <- read.csv('UBER-PRE.csv')

# Split the data into training and testing sets
set.seed(123) # for reproducibility
train_index <- createDataPartition(uber$Close, p = 0.8, list = FALSE)
train_data <- uber[train_index, ]
test_data <- uber[-train_index, ]

# The Random Forest model
model <- randomForest(Close ~ Open + High + Low + Adj_Close + Volume, data =
train_data)

# Make predictions on the test data
predictions <- predict(model, newdata = test_data)

# Calculate the Mean Squared Error
mse <- mean((test_data$Close - predictions)^2)
# Calculate R-squared for model evaluation
r_squared <- cor(test_data$Close, predictions)^2

cat("Mean Squared Error:", mse, "\n")

## Mean Squared Error: 2.084096e-05

cat("R-squared:", r_squared, "\n")

## R-squared: 0.9996201

# Let's predict the future 'Close' using the model
future_features <- data.frame(Open = c(200), High = c(220), Low = c(190),
Adj_Close = c(210), Volume = c(150000))
future_close <- predict(model, newdata = future_features)
cat("Predicted Future Close:", future_close, "\n")

## Predicted Future Close: 0.9047609

```

## DataFrame

```
output_df <- data.frame(Date = test_data$Date, Actual_Close =  
test_data$Close, Predicted_Close = predictions)  
print(output_df)
```

| ##     | Date       | Actual_Close | Predicted_Close |
|--------|------------|--------------|-----------------|
| ## 2   | 15-12-1980 | 0.15116344   | 0.15131727      |
| ## 4   | 17-12-1980 | 0.13837149   | 0.13837361      |
| ## 24  | 16-01-1981 | 0.18604700   | 0.18554740      |
| ## 26  | 20-01-1981 | 0.19418601   | 0.19419597      |
| ## 41  | 10-02-1981 | 0.15116344   | 0.15050509      |
| ## 43  | 12-02-1981 | 0.14069692   | 0.14072008      |
| ## 45  | 17-02-1981 | 0.14069692   | 0.14024301      |
| ## 51  | 25-02-1981 | 0.13255791   | 0.13201739      |
| ## 55  | 03-03-1981 | 0.14186172   | 0.14206816      |
| ## 57  | 05-03-1981 | 0.13837149   | 0.13838867      |
| ## 59  | 09-03-1981 | 0.11744261   | 0.11845616      |
| ## 61  | 11-03-1981 | 0.09883708   | 0.09878652      |
| ## 62  | 12-03-1981 | 0.10697609   | 0.10560395      |
| ## 64  | 16-03-1981 | 0.11279175   | 0.11293009      |
| ## 69  | 23-03-1981 | 0.14651258   | 0.14674308      |
| ## 70  | 24-03-1981 | 0.14534987   | 0.14504963      |
| ## 92  | 24-04-1981 | 0.16744146   | 0.16797740      |
| ## 116 | 29-05-1981 | 0.20581316   | 0.20670703      |
| ## 128 | 16-06-1981 | 0.19302329   | 0.19288478      |
| ## 131 | 19-06-1981 | 0.17907070   | 0.17893132      |
| ## 135 | 25-06-1981 | 0.17209233   | 0.17201106      |
| ## 155 | 24-07-1981 | 0.12093076   | 0.12112629      |
| ## 163 | 05-08-1981 | 0.13837149   | 0.13783656      |
| ## 185 | 04-09-1981 | 0.08720992   | 0.08951763      |
| ## 187 | 09-09-1981 | 0.08139634   | 0.08115442      |
| ## 189 | 11-09-1981 | 0.08023363   | 0.07970482      |
| ## 198 | 24-09-1981 | 0.05000094   | 0.05155207      |
| ## 207 | 07-10-1981 | 0.06395352   | 0.06418687      |
| ## 208 | 08-10-1981 | 0.06976710   | 0.06968824      |
| ## 214 | 16-10-1981 | 0.06744167   | 0.06745180      |
| ## 216 | 20-10-1981 | 0.08023363   | 0.07944155      |
| ## 217 | 21-10-1981 | 0.08023363   | 0.07956774      |
| ## 219 | 23-10-1981 | 0.07441796   | 0.07455930      |
| ## 226 | 03-11-1981 | 0.08139634   | 0.08154774      |
| ## 228 | 05-11-1981 | 0.06395352   | 0.06401789      |
| ## 230 | 09-11-1981 | 0.06744167   | 0.06716165      |
| ## 232 | 11-11-1981 | 0.07325525   | 0.07345798      |
| ## 235 | 16-11-1981 | 0.06395352   | 0.06404843      |
| ## 238 | 19-11-1981 | 0.07325525   | 0.07328563      |
| ## 241 | 24-11-1981 | 0.06511624   | 0.06553045      |
| ## 249 | 07-12-1981 | 0.07558068   | 0.07459125      |
| ## 258 | 18-12-1981 | 0.11046632   | 0.10950946      |
| ## 261 | 23-12-1981 | 0.09999979   | 0.09989701      |
| ## 265 | 30-12-1981 | 0.10348794   | 0.10312024      |

|        |            |            |            |
|--------|------------|------------|------------|
| ## 266 | 31-12-1981 | 0.10348794 | 0.10340782 |
| ## 272 | 11-01-1982 | 0.07092982 | 0.07118909 |
| ## 276 | 15-01-1982 | 0.08372177 | 0.08403575 |
| ## 278 | 19-01-1982 | 0.08255906 | 0.08276292 |
| ## 300 | 19-02-1982 | 0.07209253 | 0.07505866 |
| ## 301 | 22-02-1982 | 0.06976710 | 0.06977265 |
| ## 303 | 24-02-1982 | 0.06860439 | 0.06863156 |
| ## 308 | 03-03-1982 | 0.06860439 | 0.06846022 |
| ## 309 | 04-03-1982 | 0.06511624 | 0.06551748 |
| ## 310 | 05-03-1982 | 0.05232637 | 0.05163915 |
| ## 315 | 12-03-1982 | 0.03953441 | 0.03966639 |
| ## 316 | 15-03-1982 | 0.03837170 | 0.03865717 |
| ## 319 | 18-03-1982 | 0.03953441 | 0.03939170 |
| ## 321 | 22-03-1982 | 0.06395352 | 0.06360820 |
| ## 326 | 29-03-1982 | 0.05232637 | 0.05140090 |
| ## 327 | 30-03-1982 | 0.05465180 | 0.05418696 |
| ## 333 | 07-04-1982 | 0.05930266 | 0.06051309 |
| ## 348 | 29-04-1982 | 0.03372084 | 0.03444003 |
| ## 358 | 13-05-1982 | 0.03953441 | 0.03937657 |
| ## 359 | 14-05-1982 | 0.03372084 | 0.03627704 |
| ## 360 | 17-05-1982 | 0.03139540 | 0.03112140 |
| ## 365 | 24-05-1982 | 0.03139540 | 0.03049229 |
| ## 369 | 28-05-1982 | 0.02790726 | 0.03199418 |
| ## 381 | 16-06-1982 | 0.02209368 | 0.02246651 |
| ## 384 | 21-06-1982 | 0.01744282 | 0.01857156 |
| ## 385 | 22-06-1982 | 0.02209368 | 0.02801021 |
| ## 390 | 29-06-1982 | 0.01628010 | 0.01694474 |
| ## 405 | 21-07-1982 | 0.03023269 | 0.02957758 |
| ## 407 | 23-07-1982 | 0.02906997 | 0.03324363 |
| ## 411 | 29-07-1982 | 0.02209368 | 0.02187475 |
| ## 414 | 03-08-1982 | 0.01860553 | 0.01844572 |
| ## 418 | 09-08-1982 | 0.01279196 | 0.01369035 |
| ## 436 | 02-09-1982 | 0.06744167 | 0.06701063 |
| ## 448 | 21-09-1982 | 0.06744167 | 0.06737869 |
| ## 451 | 24-09-1982 | 0.06627896 | 0.06625688 |
| ## 453 | 28-09-1982 | 0.06860439 | 0.06857073 |
| ## 465 | 14-10-1982 | 0.11744261 | 0.11594543 |
| ## 466 | 15-10-1982 | 0.11162903 | 0.11166245 |
| ## 479 | 03-11-1982 | 0.18372157 | 0.17667224 |
| ## 481 | 05-11-1982 | 0.17790799 | 0.17852124 |
| ## 482 | 08-11-1982 | 0.16627875 | 0.16845122 |
| ## 486 | 12-11-1982 | 0.19883687 | 0.20309084 |
| ## 488 | 16-11-1982 | 0.17674527 | 0.17935570 |
| ## 503 | 08-12-1982 | 0.20581316 | 0.20993856 |
| ## 505 | 10-12-1982 | 0.16976689 | 0.17414130 |
| ## 506 | 13-12-1982 | 0.16395332 | 0.16573160 |
| ## 509 | 16-12-1982 | 0.16511603 | 0.16425283 |
| ## 523 | 06-01-1983 | 0.16860418 | 0.16953689 |
| ## 524 | 07-01-1983 | 0.15348888 | 0.15859209 |
| ## 530 | 17-01-1983 | 0.21511697 | 0.21339940 |

|        |            |            |            |
|--------|------------|------------|------------|
| ## 531 | 18-01-1983 | 0.20814068 | 0.21073876 |
| ## 532 | 19-01-1983 | 0.21046611 | 0.21184426 |
| ## 534 | 21-01-1983 | 0.24534966 | 0.24647591 |
| ## 538 | 27-01-1983 | 0.27674506 | 0.26354954 |
| ## 539 | 28-01-1983 | 0.27907049 | 0.28261444 |
| ## 540 | 31-01-1983 | 0.27790778 | 0.27986769 |
| ## 544 | 04-02-1983 | 0.30697775 | 0.31019304 |
| ## 546 | 08-02-1983 | 0.28720950 | 0.28917837 |
| ## 548 | 10-02-1983 | 0.31627948 | 0.30437701 |
| ## 551 | 15-02-1983 | 0.31976762 | 0.32256269 |
| ## 557 | 24-02-1983 | 0.34534945 | 0.34205569 |
| ## 558 | 25-02-1983 | 0.33255750 | 0.33920196 |
| ## 560 | 01-03-1983 | 0.32906935 | 0.32624646 |
| ## 566 | 09-03-1983 | 0.30348752 | 0.29770641 |
| ## 573 | 18-03-1983 | 0.29767394 | 0.29535647 |
| ## 581 | 30-03-1983 | 0.30930318 | 0.30467505 |
| ## 586 | 07-04-1983 | 0.26627854 | 0.26753391 |
| ## 591 | 14-04-1983 | 0.31627948 | 0.31207867 |
| ## 595 | 20-04-1983 | 0.36860376 | 0.34940597 |
| ## 596 | 21-04-1983 | 0.38139572 | 0.37277448 |
| ## 599 | 26-04-1983 | 0.36279018 | 0.35834422 |
| ## 606 | 05-05-1983 | 0.40814026 | 0.39059046 |
| ## 607 | 06-05-1983 | 0.41046569 | 0.41099291 |
| ## 613 | 16-05-1983 | 0.37907029 | 0.37840030 |
| ## 615 | 18-05-1983 | 0.38604658 | 0.38158843 |
| ## 616 | 19-05-1983 | 0.40116188 | 0.39538276 |
| ## 622 | 27-05-1983 | 0.45000010 | 0.45060549 |
| ## 626 | 03-06-1983 | 0.46860564 | 0.45739906 |
| ## 629 | 08-06-1983 | 0.45465097 | 0.45586299 |
| ## 634 | 15-06-1983 | 0.40348940 | 0.41050742 |
| ## 646 | 01-07-1983 | 0.35581389 | 0.35674437 |
| ## 647 | 05-07-1983 | 0.33721044 | 0.34200301 |
| ## 651 | 11-07-1983 | 0.33953587 | 0.33296317 |
| ## 656 | 18-07-1983 | 0.30930318 | 0.30375038 |
| ## 657 | 19-07-1983 | 0.30465232 | 0.31259425 |
| ## 660 | 22-07-1983 | 0.30465232 | 0.30472250 |
| ## 666 | 01-08-1983 | 0.21860512 | 0.22222568 |
| ## 668 | 03-08-1983 | 0.22209326 | 0.22202815 |
| ## 674 | 11-08-1983 | 0.21162882 | 0.21408932 |
| ## 677 | 16-08-1983 | 0.21279154 | 0.21432757 |
| ## 681 | 22-08-1983 | 0.21046611 | 0.21040640 |
| ## 689 | 01-09-1983 | 0.23604585 | 0.23764936 |
| ## 694 | 09-09-1983 | 0.18255885 | 0.18503857 |
| ## 696 | 13-09-1983 | 0.19534872 | 0.19099044 |
| ## 704 | 23-09-1983 | 0.12325619 | 0.12137224 |
| ## 706 | 27-09-1983 | 0.11627989 | 0.11894155 |
| ## 708 | 29-09-1983 | 0.10930360 | 0.10994977 |
| ## 709 | 30-09-1983 | 0.11279175 | 0.11140079 |
| ## 711 | 04-10-1983 | 0.11046632 | 0.11188413 |
| ## 713 | 06-10-1983 | 0.10465065 | 0.10440472 |

|        |            |            |            |
|--------|------------|------------|------------|
| ## 716 | 11-10-1983 | 0.07790820 | 0.07934074 |
| ## 720 | 17-10-1983 | 0.09302350 | 0.09790948 |
| ## 729 | 28-10-1983 | 0.09186078 | 0.09177374 |
| ## 730 | 31-10-1983 | 0.10813880 | 0.10203614 |
| ## 735 | 07-11-1983 | 0.09302350 | 0.09332183 |
| ## 738 | 10-11-1983 | 0.08023363 | 0.08032592 |
| ## 750 | 29-11-1983 | 0.09069807 | 0.09372202 |
| ## 751 | 30-11-1983 | 0.08720992 | 0.08869321 |
| ## 756 | 07-12-1983 | 0.09302350 | 0.09250843 |
| ## 762 | 15-12-1983 | 0.12441890 | 0.12198808 |
| ## 769 | 27-12-1983 | 0.12790705 | 0.12768964 |
| ## 776 | 06-01-1984 | 0.15581431 | 0.15526385 |
| ## 778 | 10-01-1984 | 0.15465159 | 0.15060417 |
| ## 781 | 13-01-1984 | 0.15116344 | 0.15258075 |
| ## 794 | 01-02-1984 | 0.12674433 | 0.12833915 |
| ## 796 | 03-02-1984 | 0.12558162 | 0.12787719 |
| ## 798 | 07-02-1984 | 0.12209347 | 0.11659909 |
| ## 800 | 09-02-1984 | 0.11744261 | 0.11532899 |
| ## 807 | 21-02-1984 | 0.14069692 | 0.13752422 |
| ## 814 | 01-03-1984 | 0.14883801 | 0.14417446 |
| ## 815 | 02-03-1984 | 0.15116344 | 0.15202091 |
| ## 828 | 21-03-1984 | 0.13953421 | 0.14005684 |
| ## 849 | 19-04-1984 | 0.16046517 | 0.15920978 |
| ## 850 | 23-04-1984 | 0.16162789 | 0.16252619 |
| ## 851 | 24-04-1984 | 0.15697702 | 0.15808384 |
| ## 866 | 15-05-1984 | 0.19418601 | 0.19335411 |
| ## 867 | 16-05-1984 | 0.18139613 | 0.18520841 |
| ## 868 | 17-05-1984 | 0.16860418 | 0.16959215 |
| ## 873 | 24-05-1984 | 0.17092961 | 0.17167541 |
| ## 874 | 25-05-1984 | 0.17209233 | 0.17295589 |
| ## 875 | 29-05-1984 | 0.17092961 | 0.17113473 |
| ## 876 | 30-05-1984 | 0.16744146 | 0.16672857 |
| ## 883 | 08-06-1984 | 0.16395332 | 0.16318916 |
| ## 885 | 12-06-1984 | 0.16860418 | 0.16673009 |
| ## 887 | 14-06-1984 | 0.16627875 | 0.16703553 |
| ## 890 | 19-06-1984 | 0.17092961 | 0.17367630 |
| ## 891 | 20-06-1984 | 0.17907070 | 0.17508613 |
| ## 896 | 27-06-1984 | 0.13255791 | 0.13271936 |
| ## 900 | 03-07-1984 | 0.13255791 | 0.13243270 |
| ## 908 | 16-07-1984 | 0.13720877 | 0.13646288 |
| ## 913 | 23-07-1984 | 0.13139520 | 0.13005168 |
| ## 914 | 24-07-1984 | 0.14534987 | 0.14157469 |
| ## 918 | 30-07-1984 | 0.13488334 | 0.13841659 |
| ## 927 | 10-08-1984 | 0.16279060 | 0.16633317 |
| ## 931 | 16-08-1984 | 0.15930245 | 0.15887300 |
| ## 934 | 21-08-1984 | 0.16279060 | 0.16045898 |
| ## 937 | 24-08-1984 | 0.15930245 | 0.15892485 |
| ## 950 | 13-09-1984 | 0.15348888 | 0.15308284 |
| ## 958 | 25-09-1984 | 0.14069692 | 0.14112137 |
| ## 961 | 28-09-1984 | 0.13139520 | 0.13095217 |



|         |            |            |            |
|---------|------------|------------|------------|
| ## 967  | 08-10-1984 | 0.12906977 | 0.12845428 |
| ## 968  | 09-10-1984 | 0.12674433 | 0.12725493 |
| ## 974  | 17-10-1984 | 0.12906977 | 0.12869436 |
| ## 982  | 29-10-1984 | 0.12790705 | 0.12798002 |
| ## 983  | 30-10-1984 | 0.13023248 | 0.13039833 |
| ## 990  | 08-11-1984 | 0.12790705 | 0.13042796 |
| ## 995  | 15-11-1984 | 0.11860532 | 0.11901513 |
| ## 1001 | 26-11-1984 | 0.12093076 | 0.12113827 |
| ## 1003 | 28-11-1984 | 0.13837149 | 0.13810167 |
| ## 1007 | 04-12-1984 | 0.12906977 | 0.12938995 |
| ## 1010 | 07-12-1984 | 0.15116344 | 0.15334817 |
| ## 1012 | 11-12-1984 | 0.14302444 | 0.14448124 |
| ## 1021 | 24-12-1984 | 0.15348888 | 0.15294024 |
| ## 1027 | 03-01-1985 | 0.16162789 | 0.16286754 |
| ## 1029 | 07-01-1985 | 0.16046517 | 0.16079176 |
| ## 1030 | 08-01-1985 | 0.15813974 | 0.15916570 |
| ## 1049 | 04-02-1985 | 0.16976689 | 0.17024147 |
| ## 1060 | 20-02-1985 | 0.14302444 | 0.14611765 |
| ## 1072 | 08-03-1985 | 0.09767436 | 0.09801527 |
| ## 1077 | 15-03-1985 | 0.10813880 | 0.10639071 |
| ## 1079 | 19-03-1985 | 0.10232522 | 0.10492668 |
| ## 1082 | 22-03-1985 | 0.10465065 | 0.10560529 |
| ## 1085 | 27-03-1985 | 0.10116251 | 0.10334020 |
| ## 1095 | 11-04-1985 | 0.09651164 | 0.09715440 |
| ## 1099 | 17-04-1985 | 0.10813880 | 0.10814209 |
| ## 1102 | 22-04-1985 | 0.09883708 | 0.10123043 |
| ## 1104 | 24-04-1985 | 0.10232522 | 0.10264745 |
| ## 1109 | 01-05-1985 | 0.09186078 | 0.09265929 |
| ## 1111 | 03-05-1985 | 0.08372177 | 0.08209508 |
| ## 1119 | 15-05-1985 | 0.08372177 | 0.08414850 |
| ## 1125 | 23-05-1985 | 0.08139634 | 0.08266727 |
| ## 1139 | 13-06-1985 | 0.03604627 | 0.04027896 |
| ## 1150 | 28-06-1985 | 0.06511624 | 0.06682375 |
| ## 1154 | 05-07-1985 | 0.06162809 | 0.06208108 |
| ## 1157 | 10-07-1985 | 0.06511624 | 0.06532461 |
| ## 1162 | 17-07-1985 | 0.06162809 | 0.06098520 |
| ## 1167 | 24-07-1985 | 0.04883822 | 0.04952790 |
| ## 1168 | 25-07-1985 | 0.05232637 | 0.05200382 |
| ## 1176 | 06-08-1985 | 0.03953441 | 0.03990842 |
| ## 1178 | 08-08-1985 | 0.03837170 | 0.03849324 |
| ## 1182 | 14-08-1985 | 0.03372084 | 0.03691002 |
| ## 1185 | 19-08-1985 | 0.03720898 | 0.03708961 |
| ## 1186 | 20-08-1985 | 0.03953441 | 0.03959055 |
| ## 1197 | 05-09-1985 | 0.03604627 | 0.03624606 |
| ## 1201 | 11-09-1985 | 0.04185984 | 0.04111757 |
| ## 1202 | 12-09-1985 | 0.04767551 | 0.04719499 |
| ## 1213 | 30-09-1985 | 0.04418736 | 0.04452948 |
| ## 1227 | 18-10-1985 | 0.06279081 | 0.06512373 |
| ## 1230 | 23-10-1985 | 0.06511624 | 0.06597169 |
| ## 1232 | 25-10-1985 | 0.06511624 | 0.06614003 |

|         |            |            |            |
|---------|------------|------------|------------|
| ## 1234 | 29-10-1985 | 0.06395352 | 0.06396382 |
| ## 1238 | 04-11-1985 | 0.07209253 | 0.07239508 |
| ## 1239 | 05-11-1985 | 0.07092982 | 0.07150611 |
| ## 1241 | 07-11-1985 | 0.08023363 | 0.08037480 |
| ## 1252 | 22-11-1985 | 0.07441796 | 0.07417509 |
| ## 1253 | 25-11-1985 | 0.07558068 | 0.07428219 |
| ## 1254 | 26-11-1985 | 0.07790820 | 0.07672917 |
| ## 1259 | 04-12-1985 | 0.08837264 | 0.08707241 |
| ## 1260 | 05-12-1985 | 0.08488449 | 0.08468075 |
| ## 1268 | 17-12-1985 | 0.08953535 | 0.08940171 |
| ## 1273 | 24-12-1985 | 0.09999979 | 0.09924028 |
| ## 1276 | 30-12-1985 | 0.10465065 | 0.10431780 |
| ## 1279 | 03-01-1986 | 0.10581337 | 0.10498026 |
| ## 1280 | 06-01-1986 | 0.10465065 | 0.10395335 |
| ## 1282 | 08-01-1986 | 0.11046632 | 0.11259209 |
| ## 1283 | 09-01-1986 | 0.10813880 | 0.10744222 |
| ## 1285 | 13-01-1986 | 0.11162903 | 0.11017827 |
| ## 1287 | 15-01-1986 | 0.11976804 | 0.11818484 |
| ## 1290 | 20-01-1986 | 0.11976804 | 0.11967929 |
| ## 1296 | 28-01-1986 | 0.10465065 | 0.10416853 |
| ## 1301 | 04-02-1986 | 0.11860532 | 0.11969963 |
| ## 1302 | 05-02-1986 | 0.11860532 | 0.11774065 |
| ## 1303 | 06-02-1986 | 0.12209347 | 0.12062234 |
| ## 1310 | 18-02-1986 | 0.11976804 | 0.11875817 |
| ## 1315 | 25-02-1986 | 0.14302444 | 0.14017140 |
| ## 1320 | 04-03-1986 | 0.12674433 | 0.12683343 |
| ## 1334 | 24-03-1986 | 0.14651258 | 0.14928290 |
| ## 1341 | 03-04-1986 | 0.14883801 | 0.14975201 |
| ## 1342 | 04-04-1986 | 0.14651258 | 0.14744487 |
| ## 1357 | 25-04-1986 | 0.19767415 | 0.19488654 |
| ## 1361 | 01-05-1986 | 0.17907070 | 0.17722833 |
| ## 1368 | 12-05-1986 | 0.23604585 | 0.23016430 |
| ## 1371 | 15-05-1986 | 0.23255770 | 0.23379311 |
| ## 1376 | 22-05-1986 | 0.23953608 | 0.24021264 |
| ## 1381 | 30-05-1986 | 0.24186151 | 0.24146345 |
| ## 1383 | 03-06-1986 | 0.25000052 | 0.24878248 |
| ## 1400 | 26-06-1986 | 0.23488313 | 0.23267413 |
| ## 1403 | 01-07-1986 | 0.22674413 | 0.22649840 |
| ## 1415 | 18-07-1986 | 0.19302329 | 0.19191027 |
| ## 1420 | 25-07-1986 | 0.21395425 | 0.21270428 |
| ## 1424 | 31-07-1986 | 0.18837243 | 0.18692143 |
| ## 1430 | 08-08-1986 | 0.19186057 | 0.19364508 |
| ## 1435 | 15-08-1986 | 0.23023227 | 0.23132893 |
| ## 1442 | 26-08-1986 | 0.23837128 | 0.23820289 |
| ## 1445 | 29-08-1986 | 0.24186151 | 0.24603161 |
| ## 1452 | 10-09-1986 | 0.22325598 | 0.22519871 |
| ## 1458 | 18-09-1986 | 0.21395425 | 0.21567402 |
| ## 1460 | 22-09-1986 | 0.22558141 | 0.22243490 |
| ## 1465 | 29-09-1986 | 0.19999958 | 0.20112824 |
| ## 1466 | 30-09-1986 | 0.20930339 | 0.20786833 |

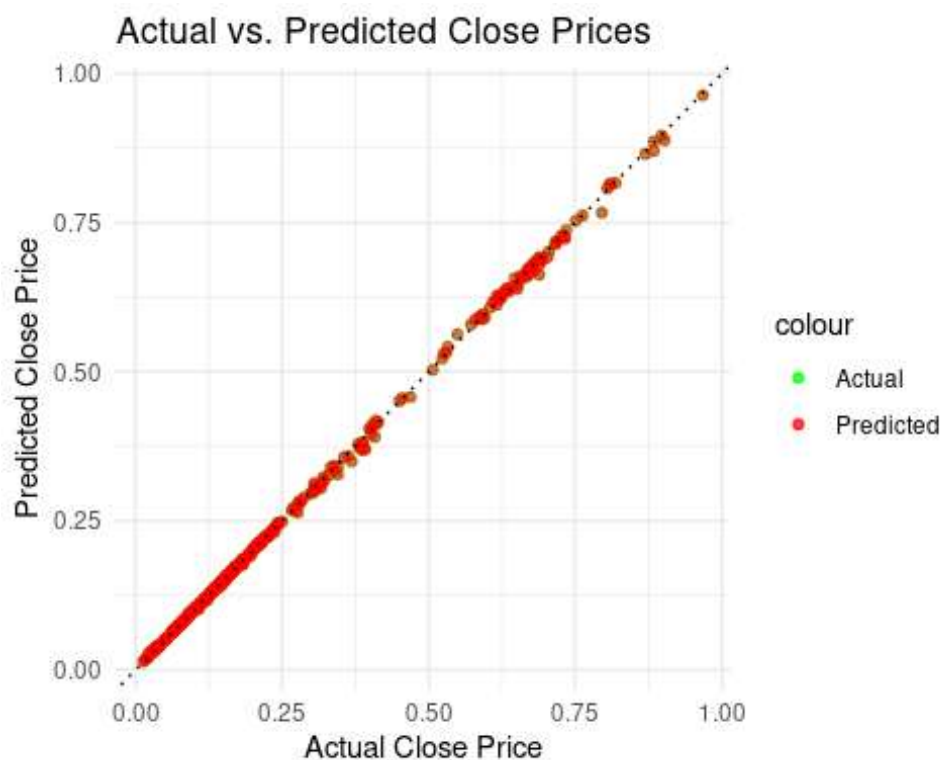
|         |            |            |            |
|---------|------------|------------|------------|
| ## 1470 | 06-10-1986 | 0.21511697 | 0.21365952 |
| ## 1472 | 08-10-1986 | 0.20232501 | 0.20185306 |
| ## 1473 | 09-10-1986 | 0.20465045 | 0.20462579 |
| ## 1477 | 15-10-1986 | 0.20814068 | 0.20770293 |
| ## 1478 | 16-10-1986 | 0.21046611 | 0.21080449 |
| ## 1496 | 11-11-1986 | 0.22790684 | 0.22606006 |
| ## 1502 | 19-11-1986 | 0.22325598 | 0.22230612 |
| ## 1503 | 20-11-1986 | 0.22558141 | 0.22531423 |
| ## 1506 | 25-11-1986 | 0.27209420 | 0.26641066 |
| ## 1508 | 28-11-1986 | 0.26976669 | 0.27220004 |
| ## 1516 | 10-12-1986 | 0.30232481 | 0.29860313 |
| ## 1522 | 18-12-1986 | 0.28255864 | 0.28239697 |
| ## 1531 | 02-01-1987 | 0.27790778 | 0.27685867 |
| ## 1536 | 09-01-1987 | 0.31976762 | 0.31536646 |
| ## 1537 | 12-01-1987 | 0.32093034 | 0.31747418 |
| ## 1539 | 14-01-1987 | 0.34534945 | 0.32777466 |
| ## 1542 | 19-01-1987 | 0.39186016 | 0.36989901 |
| ## 1545 | 22-01-1987 | 0.38604658 | 0.36857679 |
| ## 1548 | 27-01-1987 | 0.38837201 | 0.37081876 |
| ## 1551 | 30-01-1987 | 0.41395384 | 0.41560184 |
| ## 1554 | 04-02-1987 | 0.40930297 | 0.41809600 |
| ## 1555 | 05-02-1987 | 0.39883645 | 0.40432349 |
| ## 1556 | 06-02-1987 | 0.39999917 | 0.40416445 |
| ## 1558 | 10-02-1987 | 0.38837201 | 0.37894380 |
| ## 1567 | 24-02-1987 | 0.50697734 | 0.50322364 |
| ## 1575 | 06-03-1987 | 0.52325535 | 0.52189286 |
| ## 1585 | 20-03-1987 | 0.53255916 | 0.54180875 |
| ## 1601 | 13-04-1987 | 0.52558078 | 0.53088138 |
| ## 1609 | 24-04-1987 | 0.59302246 | 0.59664834 |
| ## 1610 | 27-04-1987 | 0.59534789 | 0.59016452 |
| ## 1612 | 29-04-1987 | 0.62092971 | 0.62279956 |
| ## 1618 | 07-05-1987 | 0.64418611 | 0.64327635 |
| ## 1620 | 11-05-1987 | 0.61395342 | 0.61856112 |
| ## 1626 | 19-05-1987 | 0.57906987 | 0.58741211 |
| ## 1629 | 22-05-1987 | 0.58720888 | 0.59283421 |
| ## 1643 | 12-06-1987 | 0.63255895 | 0.63587085 |
| ## 1647 | 18-06-1987 | 0.66976794 | 0.66172117 |
| ## 1649 | 22-06-1987 | 0.67906966 | 0.67070892 |
| ## 1654 | 29-06-1987 | 0.65581327 | 0.65314360 |
| ## 1659 | 07-07-1987 | 0.62790601 | 0.63378612 |
| ## 1669 | 21-07-1987 | 0.66744250 | 0.66739723 |
| ## 1674 | 28-07-1987 | 0.67674423 | 0.67884479 |
| ## 1678 | 03-08-1987 | 0.64651154 | 0.65686521 |
| ## 1682 | 07-08-1987 | 0.76279143 | 0.76213539 |
| ## 1683 | 10-08-1987 | 0.79534955 | 0.76676642 |
| ## 1684 | 11-08-1987 | 0.81860387 | 0.81655280 |
| ## 1686 | 13-08-1987 | 0.80930214 | 0.81579710 |
| ## 1687 | 14-08-1987 | 0.80930214 | 0.81272972 |
| ## 1689 | 18-08-1987 | 0.80465128 | 0.80744681 |
| ## 1692 | 21-08-1987 | 0.88372011 | 0.87019934 |

|         |            |            |            |
|---------|------------|------------|------------|
| ## 1693 | 24-08-1987 | 0.86976752 | 0.86543564 |
| ## 1698 | 31-08-1987 | 0.90232564 | 0.88793348 |
| ## 1705 | 10-09-1987 | 0.89767478 | 0.89591593 |
| ## 1707 | 14-09-1987 | 0.88372011 | 0.88575433 |
| ## 1716 | 25-09-1987 | 0.96744188 | 0.96378612 |
| ## 1743 | 03-11-1987 | 0.57209358 | 0.57902560 |
| ## 1747 | 09-11-1987 | 0.59069703 | 0.58777512 |
| ## 1760 | 27-11-1987 | 0.54883718 | 0.56262123 |
| ## 1770 | 11-12-1987 | 0.53023165 | 0.53222409 |
| ## 1775 | 18-12-1987 | 0.65116240 | 0.64491848 |
| ## 1783 | 31-12-1987 | 0.67906966 | 0.68251750 |
| ## 1789 | 11-01-1988 | 0.68837139 | 0.66304892 |
| ## 1790 | 12-01-1988 | 0.67906966 | 0.66940382 |
| ## 1794 | 18-01-1988 | 0.69302225 | 0.68809104 |
| ## 1795 | 19-01-1988 | 0.69302225 | 0.68751675 |
| ## 1796 | 20-01-1988 | 0.63720982 | 0.63471796 |
| ## 1803 | 29-01-1988 | 0.66976794 | 0.66373801 |
| ## 1806 | 03-02-1988 | 0.63255895 | 0.63992565 |
| ## 1808 | 05-02-1988 | 0.61627885 | 0.62728516 |
| ## 1814 | 16-02-1988 | 0.66511707 | 0.65870779 |
| ## 1815 | 17-02-1988 | 0.67674423 | 0.67294597 |
| ## 1818 | 22-02-1988 | 0.70232606 | 0.69149953 |
| ## 1820 | 24-02-1988 | 0.68372052 | 0.68648981 |
| ## 1822 | 26-02-1988 | 0.67441880 | 0.67331340 |
| ## 1839 | 22-03-1988 | 0.71627864 | 0.71402642 |
| ## 1847 | 04-04-1988 | 0.61860428 | 0.62772033 |
| ## 1865 | 28-04-1988 | 0.66744250 | 0.66901446 |
| ## 1872 | 09-05-1988 | 0.65581327 | 0.66015109 |
| ## 1882 | 23-05-1988 | 0.60465170 | 0.60737373 |
| ## 1888 | 01-06-1988 | 0.68837139 | 0.67914202 |
| ## 1889 | 02-06-1988 | 0.67441880 | 0.67332627 |
| ## 1892 | 07-06-1988 | 0.71627864 | 0.71815640 |
| ## 1901 | 20-06-1988 | 0.71860407 | 0.71804265 |
| ## 1902 | 21-06-1988 | 0.73255875 | 0.72314352 |
| ## 1904 | 23-06-1988 | 0.73488418 | 0.73778700 |
| ## 1906 | 27-06-1988 | 0.72558037 | 0.72804289 |
| ## 1913 | 07-07-1988 | 0.75116219 | 0.75318794 |
| ## 1917 | 13-07-1988 | 0.73023331 | 0.72767397 |
| ## 1924 | 22-07-1988 | 0.68837139 | 0.69233975 |
| ## 1928 | 28-07-1988 | 0.69069682 | 0.69029995 |
| ## 1932 | 03-08-1988 | 0.73023331 | 0.72601224 |
| ## 1943 | 18-08-1988 | 0.68837139 | 0.68699581 |
| ## 1953 | 01-09-1988 | 0.62092971 | 0.62550299 |
| ## 1956 | 07-09-1988 | 0.60930256 | 0.61717496 |
| ## 1958 | 09-09-1988 | 0.65116240 | 0.63881934 |
| ## 1959 | 12-09-1988 | 0.66046413 | 0.66086825 |
| ## 1966 | 21-09-1988 | 0.69302225 | 0.68756094 |
| ## 1970 | 27-09-1988 | 0.70465149 | 0.70195556 |
| ## 1975 | 04-10-1988 | 0.66976794 | 0.67378197 |
| ## 1977 | 06-10-1988 | 0.63720982 | 0.63902997 |

```
## 1991 26-10-1988 0.62790601 0.63083943
## 1992 27-10-1988 0.62325515 0.62279338
## 1994 31-10-1988 0.61627885 0.61224206
## 1997 03-11-1988 0.58837159 0.59105111
```

## Plots

```
# Create a scatter plot using ggplot2
ggplot(output_df, aes(x = Actual_Close, y = Predicted_Close)) +
  geom_point(aes(color = "Actual"), alpha = 0.5) + # Actual points with blue
color and transparency
  geom_point(aes(color = "Predicted"), alpha = 0.5) + # Predicted points with
red color and transparency
  geom_abline(intercept = 0, slope = 1, color = "black", linetype = "dotted")
+
  labs(title = "Actual vs. Predicted Close Prices", x = "Actual Close Price",
y = "Predicted Close Price") +
  scale_color_manual(values = c("Actual" = "green", "Predicted" = "red")) +
  theme_minimal()
```



## # Sairaj Salvi Code performed for the Long Short-Term Memory (LSTM) for all data

### # LSTM Code

```
# Required Libraries and Packages
library(tidyverse)
install.packages('keras')
library(keras)

# Load and preprocess the data
df <- read.csv('UBER-PRE.csv')

# Remove non-numeric columns
numeric_columns <- sapply(df, is.numeric)
df_numeric <- df[, numeric_columns]

# Check for missing values and replace them
df_numeric[is.na(df_numeric)] <- 0 # Replace missing values with 0

# Normalize the data
normalize <- function(x) {
  return((x - min(x)) / (max(x) - min(x)))
}

df_normalized <- as.data.frame(lapply(df_numeric, normalize))

# Prepare sequences for LSTM
sequence_length <- 10 # You can adjust this based on your preference
sequences <- matrix(0, nrow = nrow(df_normalized) - sequence_length + 1,
ncol = sequence_length, byrow = TRUE)
for (i in 1:(nrow(df_normalized) - sequence_length + 1)) {
  sequences[i, ] <- df_normalized$Close[i:(i + sequence_length - 1)]
}
targets <- df_normalized$Close[(sequence_length):(nrow(df_normalized))]
```

```
# LSTM model generation
model <- keras_model_sequential()
model %>%
  layer_lstm(units = 50, input_shape = c(sequence_length, 1)) %>%
  layer_dense(units = 1)

# Compiles the model for mean squared error and absolute error
model %>% compile(
  loss = 'mean_squared_error',
```

```

optimizer = optimizer_adam(),
metrics = c('mean_absolute_error')
)

# Train the model
X <- array_reshape(sequences, c(dim(sequences), 1))
history <- model %>% fit(
  x = X,
  y = targets,
  batch_size = 32,
  epochs = 100,
  validation_split = 0.1
)

# Make predictions on the entire dataset
all_sequences <- matrix(0, nrow = nrow(df_normalized) - sequence_length +
1, ncol = sequence_length, byrow = TRUE)
for (i in 1:(nrow(df_normalized) - sequence_length + 1)) {
  all_sequences[i, ] <- df_normalized$Close[i:(i + sequence_length - 1)]
}
all_X <- array_reshape(all_sequences, c(dim(all_sequences), 1))
predictions <- model %>% predict(all_X)

# Inverse normalize predictions
predictions <- predictions * (max(df$Close) - min(df$Close)) +
min(df$Close)

# Calculate Mean Squared Error
mse <- mean((df$Close[(sequence_length):(nrow(df))]] - predictions)^2)
cat("Mean Squared Error:", mse, "\n")
# Calculate R-squared value
actual_values <- df$Close[(sequence_length):(nrow(df))]
r_squared <- (cor(actual_values, predictions))^2
cat("R-squared:", r_squared, "\n")

# Calculate accuracy in percentage
# accuracy <- sum(sign(predictions -
# df$Close[(sequence_length):(nrow(df))]] == 0) / length(predictions) *
100
#cat("Accuracy:", accuracy, "%\n")

# Print the predictions

```

```

output_df <- data.frame(Date = df$Date[(sequence_length):(nrow(df))],
Actual_Close = df$Close[(sequence_length):(nrow(df))], Predicted_Close =
predictions)
print(output_df)
ggplot(output_df, aes(x = Actual_Close, y = Predicted_Close)) +
  geom_point(aes(color = "Actual"), alpha = 0.5) + # Actual points with
blue color and transparency
  geom_point(aes(color = "Predicted"), alpha = 0.5) + # Predicted points
with red color and transparency
  geom_abline(intercept = 0, slope = 1, color = "yellow", linetype =
"dashed") +
  labs(title = "Actual vs. Predicted Close Prices", x = "Actual Close
Price", y = "Predicted Close Price") +
  scale_color_manual(values = c("Actual" = "green", "Predicted" = "red"))
+
  theme_minimal()

```

Mean Squared Error: 1.334957e-06  
R-squared: 0.999978

|    | Date       | Actual_Close | Predicted_Close |
|----|------------|--------------|-----------------|
| 1  | 26-12-1980 | 0.227906841  | 0.225590184     |
| 2  | 29-12-1980 | 0.232557703  | 0.233471736     |
| 3  | 30-12-1980 | 0.224418694  | 0.226919174     |
| 4  | 31-12-1980 | 0.215116970  | 0.217454657     |
| 5  | 02-01-1981 | 0.218605116  | 0.219322786     |
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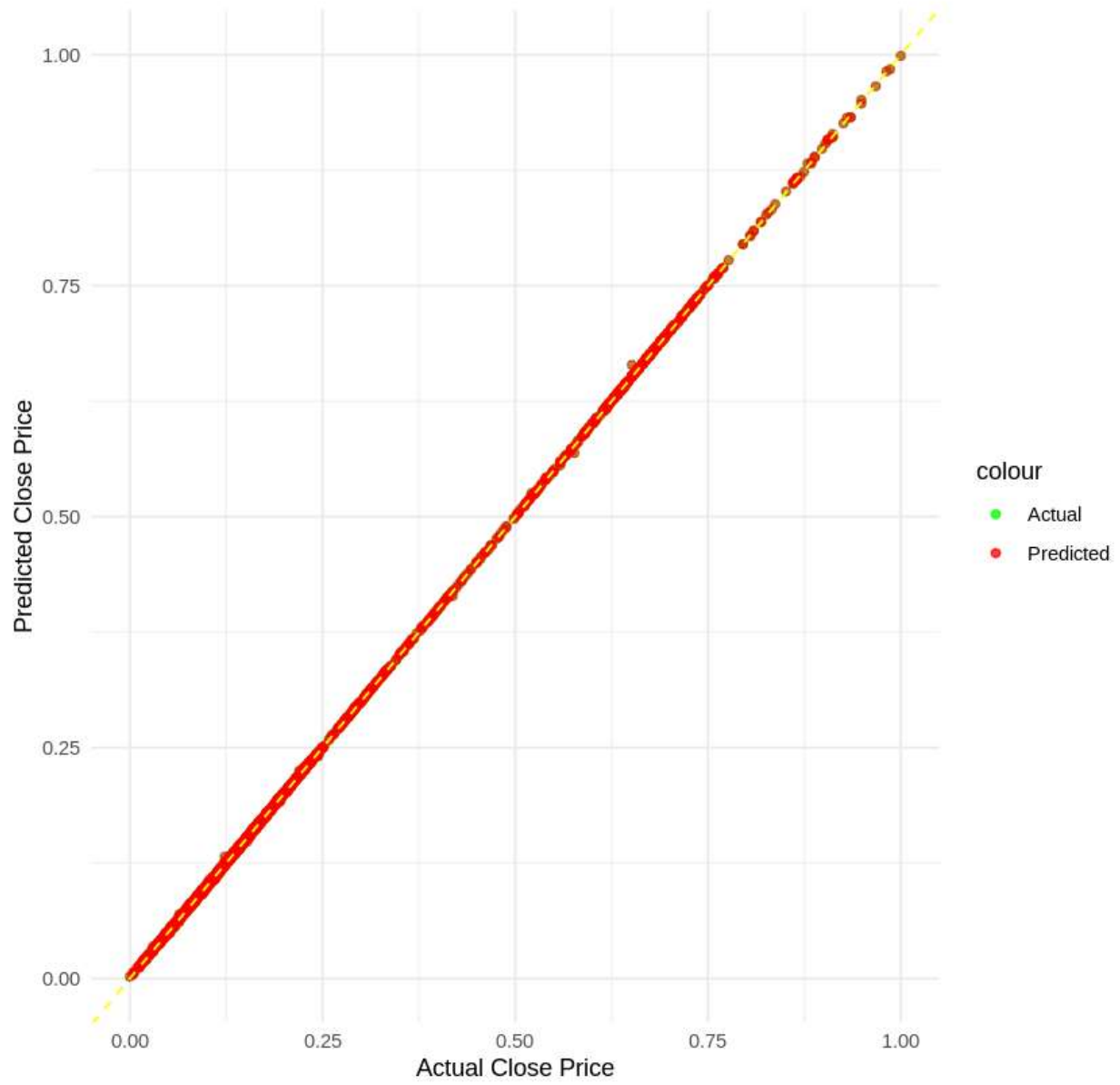
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| 959  | 09-10-1984 | 0.126744334 | 0.127328619 |
| 960  | 10-10-1984 | 0.119768040 | 0.121073507 |
| 961  | 11-10-1984 | 0.118605325 | 0.119095199 |
| 962  | 12-10-1984 | 0.109303600 | 0.110912815 |
| 963  | 15-10-1984 | 0.120930756 | 0.119375341 |
| 964  | 16-10-1984 | 0.119768040 | 0.119819179 |
| 965  | 17-10-1984 | 0.129069765 | 0.127742037 |
| 966  | 18-10-1984 | 0.136046059 | 0.135048926 |
| 967  | 19-10-1984 | 0.136046059 | 0.136286154 |
| 968  | 22-10-1984 | 0.133720627 | 0.134544238 |
| 969  | 23-10-1984 | 0.139534205 | 0.139215663 |
| 970  | 24-10-1984 | 0.141861720 | 0.141941786 |
| 971  | 25-10-1984 | 0.132557912 | 0.134378910 |
| 972  | 26-10-1984 | 0.126744334 | 0.128124431 |
| 973  | 29-10-1984 | 0.127907049 | 0.128122151 |
| 974  | 30-10-1984 | 0.130232481 | 0.130058467 |
| 975  | 31-10-1984 | 0.129069765 | 0.129337445 |
| 976  | 01-11-1984 | 0.130232481 | 0.130220905 |
| 977  | 02-11-1984 | 0.129069765 | 0.129402041 |
| 978  | 05-11-1984 | 0.127907049 | 0.128287882 |
| 979  | 06-11-1984 | 0.141861720 | 0.140036672 |
| 980  | 07-11-1984 | 0.137208774 | 0.137999326 |
| 981  | 08-11-1984 | 0.127907049 | 0.129690364 |
| 982  | 09-11-1984 | 0.113954462 | 0.116516829 |
| 983  | 12-11-1984 | 0.122093471 | 0.121324860 |
| 984  | 13-11-1984 | 0.116279894 | 0.117169514 |
| 985  | 14-11-1984 | 0.118605325 | 0.118390024 |
| 986  | 15-11-1984 | 0.118605325 | 0.118636116 |
| 987  | 16-11-1984 | 0.113954462 | 0.114755280 |
| 988  | 19-11-1984 | 0.101162507 | 0.103360653 |
| 989  | 20-11-1984 | 0.108138801 | 0.107403927 |
| 990  | 21-11-1984 | 0.112791747 | 0.112028129 |
| 991  | 23-11-1984 | 0.118605325 | 0.117675789 |
| 992  | 26-11-1984 | 0.120930756 | 0.120623387 |
| 993  | 27-11-1984 | 0.126744334 | 0.126069382 |
| 994  | 28-11-1984 | 0.138371490 | 0.136833847 |
| 995  | 29-11-1984 | 0.133720627 | 0.134754226 |
| 996  | 30-11-1984 | 0.127907049 | 0.129464805 |
| 997  | 03-12-1984 | 0.124418903 | 0.125626177 |
| 998  | 04-12-1984 | 0.129069765 | 0.128847599 |
| 999  | 05-12-1984 | 0.140696921 | 0.139194027 |
| 1000 | 06-12-1984 | 0.152326160 | 0.150762036 |

Actual vs. Predicted Close Prices



## # This Code for XGBOOST on the Data is performed by every group member.

```
# XG BOOST CODE
```

```
library(tidyverse)
install.packages('plotly')
library(plotly)
install.packages('xgboost')
library(xgboost)

# Load and preprocess the data
df <- read.csv('UBER-PRE.csv')

# Prepare data for XGBoost
X <- sequences
y <- targets

# Create the XGBoost model
xgb_model <- xgboost(data = X, label = y, nrounds = 100, verbose = 0)

# Make predictions using the XGBoost model
xgb_predictions <- predict(xgb_model, data.matrix(all_sequences))

# Inverse normalize predictions
xgb_predictions <- xgb_predictions * (max(df$Close) - min(df$Close)) +
min(df$Close)

# Calculate Mean Squared Error for XGBoost
xgb_mse <- mean((df$Close[(sequence_length):(nrow(df))]) -
xgb_predictions)^2)
cat("XGBoost Mean Squared Error:", xgb_mse, "\n")

# Calculate R-squared value for XGBoost
xgb_r_squared <- (cor(actual_values, xgb_predictions))^2
cat("XGBoost R-squared:", xgb_r_squared, "\n")

# Print the XGBoost predictions
xgb_output_df <- data.frame(Date = df$Date[(sequence_length):(nrow(df))],
Actual_Close = df$Close[(sequence_length):(nrow(df))],
XGBoost_Predicted_Close = xgb_predictions)
print(xgb_output_df)

# Create a scatter plot for XGBoost predictions
```

```

ggplot(xgb_output_df, aes(x = Actual_Close, y = XGBoost_Predicted_Close))
+
  geom_point(aes(color = "Actual"), alpha = 0.5) +
  geom_point(aes(y = Actual_Close, color = "XGBoost Predicted"), data =
xgb_output_df, alpha = 0.5) +
  geom_abline(intercept = 0, slope = 1, color = "yellow", linetype =
"dashed") +
  labs(title = "XGBoost Predicted Close Prices", x = "Actual Close Price",
y = "XGBoost Predicted Close Price") +
  scale_color_manual(values = c("Actual" = "blue", "XGBoost Predicted" =
"red")) +
  theme_minimal()

```

OUTPUT: -

XGBoost Mean Squared Error: 9.231431e-07  
XGBoost R-squared: 0.9999952

|    | Date       | Actual_Close | XGBoost_Predicted_Close |
|----|------------|--------------|-------------------------|
| 1  | 26-12-1980 | 0.227906841  | 0.227561578             |
| 2  | 29-12-1980 | 0.232557703  | 0.232805565             |
| 3  | 30-12-1980 | 0.224418694  | 0.224379078             |
| 4  | 31-12-1980 | 0.215116970  | 0.215643629             |
| 5  | 02-01-1981 | 0.218605116  | 0.217375726             |
| 6  | 05-01-1981 | 0.211628823  | 0.213954076             |
| 7  | 06-01-1981 | 0.197674152  | 0.196816087             |
| 8  | 07-01-1981 | 0.184884281  | 0.186891273             |
| 9  | 08-01-1981 | 0.179070703  | 0.179041967             |
| 10 | 09-01-1981 | 0.194186005  | 0.195222005             |
| 11 | 12-01-1981 | 0.191860574  | 0.191242084             |
| 12 | 13-01-1981 | 0.181396134  | 0.180907324             |
| 13 | 14-01-1981 | 0.182558849  | 0.180224657             |
| 14 | 15-01-1981 | 0.188372427  | 0.187859729             |
| 15 | 16-01-1981 | 0.186046996  | 0.186414406             |
| 16 | 19-01-1981 | 0.203487730  | 0.202801719             |
| 17 | 20-01-1981 | 0.194186005  | 0.195549101             |
| 18 | 21-01-1981 | 0.199999583  | 0.202029794             |
| 19 | 22-01-1981 | 0.203487730  | 0.202951491             |
| 20 | 23-01-1981 | 0.202325014  | 0.202542573             |
| 21 | 26-01-1981 | 0.197674152  | 0.196681976             |
| 22 | 27-01-1981 | 0.195348721  | 0.196002930             |
| 23 | 28-01-1981 | 0.186046996  | 0.186891273             |
| 24 | 29-01-1981 | 0.175582556  | 0.176457107             |
| 25 | 30-01-1981 | 0.160465170  | 0.160996199             |
| 26 | 02-02-1981 | 0.145349867  | 0.144695431             |
| 27 | 03-02-1981 | 0.154651592  | 0.153787404             |
| 28 | 04-02-1981 | 0.163953316  | 0.164013356             |
| 29 | 05-02-1981 | 0.163953316  | 0.164013356             |
| 30 | 06-02-1981 | 0.165116032  | 0.165274367             |
| 31 | 09-02-1981 | 0.151163445  | 0.150382146             |
| 32 | 10-02-1981 | 0.151163445  | 0.150382146             |

|    |            |             |             |
|----|------------|-------------|-------------|
| 33 | 11-02-1981 | 0.143024436 | 0.143166393 |
| 34 | 12-02-1981 | 0.140696921 | 0.141552225 |
| 35 | 13-02-1981 | 0.134883343 | 0.135005191 |
| 36 | 17-02-1981 | 0.140696921 | 0.141552225 |
| 37 | 18-02-1981 | 0.151163445 | 0.150382146 |
| 38 | 19-02-1981 | 0.136046059 | 0.135766566 |
| 39 | 20-02-1981 | 0.123256187 | 0.123587787 |
| 40 | 23-02-1981 | 0.126744334 | 0.126568824 |
| 41 | 24-02-1981 | 0.118605325 | 0.119387679 |
| 42 | 25-02-1981 | 0.132557912 | 0.132735342 |
| 43 | 26-02-1981 | 0.136046059 | 0.135855526 |
| 44 | 27-02-1981 | 0.144187151 | 0.144205704 |
| 45 | 02-03-1981 | 0.145349867 | 0.144677982 |
| 46 | 03-03-1981 | 0.141861720 | 0.142263889 |
| 47 | 04-03-1981 | 0.139534205 | 0.140723571 |
| 48 | 05-03-1981 | 0.138371490 | 0.137314588 |
| 49 | 06-03-1981 | 0.136046059 | 0.135855526 |
| 50 | 09-03-1981 | 0.117442609 | 0.115838349 |
| 51 | 10-03-1981 | 0.106976085 | 0.107496984 |
| 52 | 11-03-1981 | 0.098837076 | 0.098012693 |
| 53 | 12-03-1981 | 0.106976085 | 0.107496984 |
| 54 | 13-03-1981 | 0.104650654 | 0.104782529 |
| 55 | 16-03-1981 | 0.112791747 | 0.111801654 |
| 56 | 17-03-1981 | 0.123256187 | 0.123519920 |
| 57 | 18-03-1981 | 0.137208774 | 0.136767998 |
| 58 | 19-03-1981 | 0.134883343 | 0.134777695 |
| 59 | 20-03-1981 | 0.137208774 | 0.136767998 |
| 60 | 23-03-1981 | 0.146512583 | 0.147115022 |
| 61 | 24-03-1981 | 0.145349867 | 0.144677982 |
| 62 | 25-03-1981 | 0.140696921 | 0.141063198 |
| 63 | 26-03-1981 | 0.136046059 | 0.135855526 |
| 64 | 27-03-1981 | 0.127907049 | 0.127701864 |
| 65 | 30-03-1981 | 0.127907049 | 0.127701864 |
| 66 | 31-03-1981 | 0.125581618 | 0.125595152 |
| 67 | 01-04-1981 | 0.123256187 | 0.123519920 |
| 68 | 02-04-1981 | 0.143024436 | 0.143166393 |
| 69 | 03-04-1981 | 0.144187151 | 0.144188255 |
| 70 | 06-04-1981 | 0.139534205 | 0.140723571 |
| 71 | 07-04-1981 | 0.137208774 | 0.136767998 |
| 72 | 08-04-1981 | 0.148838014 | 0.148844182 |
| 73 | 09-04-1981 | 0.153488876 | 0.153262556 |
| 74 | 10-04-1981 | 0.156977023 | 0.157893449 |
| 75 | 13-04-1981 | 0.156977023 | 0.157893449 |
| 76 | 14-04-1981 | 0.156977023 | 0.157893449 |
| 77 | 15-04-1981 | 0.144187151 | 0.144188255 |
| 78 | 16-04-1981 | 0.130232481 | 0.129734904 |
| 79 | 20-04-1981 | 0.137208774 | 0.136679038 |
| 80 | 21-04-1981 | 0.153488876 | 0.153445616 |
| 81 | 22-04-1981 | 0.162790601 | 0.164013356 |
| 82 | 23-04-1981 | 0.169766894 | 0.167716026 |
| 83 | 24-04-1981 | 0.167441463 | 0.166723818 |
| 84 | 27-04-1981 | 0.165116032 | 0.165217414 |
| 85 | 28-04-1981 | 0.160465170 | 0.160437718 |
| 86 | 29-04-1981 | 0.156977023 | 0.157893449 |

|     |            |             |             |
|-----|------------|-------------|-------------|
| 87  | 30-04-1981 | 0.161627885 | 0.160669103 |
| 88  | 01-05-1981 | 0.161627885 | 0.160669103 |
| 89  | 04-05-1981 | 0.160465170 | 0.160669103 |
| 90  | 05-05-1981 | 0.159302454 | 0.159100711 |
| 91  | 06-05-1981 | 0.152326160 | 0.153130397 |
| 92  | 07-05-1981 | 0.155814307 | 0.153787404 |
| 93  | 08-05-1981 | 0.158139738 | 0.158788994 |
| 94  | 11-05-1981 | 0.152326160 | 0.153130397 |
| 95  | 12-05-1981 | 0.152326160 | 0.153130397 |
| 96  | 13-05-1981 | 0.151163445 | 0.150382146 |
| 97  | 14-05-1981 | 0.147675298 | 0.147395074 |
| 98  | 15-05-1981 | 0.153488876 | 0.153445616 |
| 99  | 18-05-1981 | 0.158139738 | 0.158788994 |
| 100 | 19-05-1981 | 0.153488876 | 0.153445616 |
| 101 | 20-05-1981 | 0.161627885 | 0.160669103 |
| 102 | 21-05-1981 | 0.176745272 | 0.176129475 |
| 103 | 22-05-1981 | 0.189535143 | 0.189220309 |
| 104 | 26-05-1981 | 0.188372427 | 0.187608302 |
| 105 | 27-05-1981 | 0.204650446 | 0.204549804 |
| 106 | 28-05-1981 | 0.204650446 | 0.204549804 |
| 107 | 29-05-1981 | 0.205813161 | 0.205682412 |
| 108 | 01-06-1981 | 0.205813161 | 0.205682412 |
| 109 | 02-06-1981 | 0.190697859 | 0.190556914 |
| 110 | 03-06-1981 | 0.190697859 | 0.190556914 |
| 111 | 04-06-1981 | 0.196511436 | 0.196147993 |
| 112 | 05-06-1981 | 0.191860574 | 0.191569179 |
| 113 | 08-06-1981 | 0.181396134 | 0.180547252 |
| 114 | 09-06-1981 | 0.187209712 | 0.187633067 |
| 115 | 10-06-1981 | 0.190697859 | 0.190080047 |
| 116 | 11-06-1981 | 0.203487730 | 0.202801719 |
| 117 | 12-06-1981 | 0.199999583 | 0.201880023 |
| 118 | 15-06-1981 | 0.198836868 | 0.196681976 |
| 119 | 16-06-1981 | 0.193023290 | 0.191890910 |
| 120 | 17-06-1981 | 0.188372427 | 0.188336596 |
| 121 | 18-06-1981 | 0.187209712 | 0.187782839 |
| 122 | 19-06-1981 | 0.179070703 | 0.178719372 |
| 123 | 22-06-1981 | 0.168604179 | 0.167744726 |
| 124 | 23-06-1981 | 0.173255041 | 0.174094051 |
| 125 | 24-06-1981 | 0.166278748 | 0.165690064 |
| 126 | 25-06-1981 | 0.172092325 | 0.173229188 |
| 127 | 26-06-1981 | 0.168604179 | 0.167417631 |
| 128 | 29-06-1981 | 0.159302454 | 0.159100711 |
| 129 | 30-06-1981 | 0.139534205 | 0.141212597 |
| 130 | 01-07-1981 | 0.137208774 | 0.136679038 |
| 131 | 02-07-1981 | 0.137208774 | 0.136679038 |
| 132 | 06-07-1981 | 0.129069765 | 0.128897294 |
| 133 | 07-07-1981 | 0.131395196 | 0.132081002 |
| 134 | 08-07-1981 | 0.140696921 | 0.141552225 |
| 135 | 09-07-1981 | 0.122093471 | 0.123044193 |
| 136 | 10-07-1981 | 0.104650654 | 0.104782529 |
| 137 | 13-07-1981 | 0.109303600 | 0.109487981 |
| 138 | 14-07-1981 | 0.118605325 | 0.119565576 |
| 139 | 15-07-1981 | 0.124418903 | 0.124170758 |
| 140 | 16-07-1981 | 0.130232481 | 0.129734904 |

|     |            |             |             |
|-----|------------|-------------|-------------|
| 141 | 17-07-1981 | 0.138371490 | 0.137314588 |
| 142 | 20-07-1981 | 0.122093471 | 0.122976325 |
| 143 | 21-07-1981 | 0.120930756 | 0.120227456 |
| 144 | 22-07-1981 | 0.108138801 | 0.107939862 |
| 145 | 23-07-1981 | 0.113954462 | 0.114722736 |
| 146 | 24-07-1981 | 0.120930756 | 0.120405354 |
| 147 | 27-07-1981 | 0.130232481 | 0.129734904 |
| 148 | 28-07-1981 | 0.122093471 | 0.122976325 |
| 149 | 29-07-1981 | 0.118605325 | 0.119387679 |
| 150 | 30-07-1981 | 0.126744334 | 0.126568824 |
| 151 | 31-07-1981 | 0.130232481 | 0.129734904 |
| 152 | 03-08-1981 | 0.127907049 | 0.127701864 |
| 153 | 04-08-1981 | 0.131395196 | 0.132013127 |
| 154 | 05-08-1981 | 0.138371490 | 0.137314588 |
| 155 | 06-08-1981 | 0.132557912 | 0.132735342 |
| 156 | 07-08-1981 | 0.132557912 | 0.132735342 |
| 157 | 10-08-1981 | 0.132557912 | 0.132735342 |
| 158 | 11-08-1981 | 0.125581618 | 0.125595152 |
| 159 | 12-08-1981 | 0.120930756 | 0.120227456 |
| 160 | 13-08-1981 | 0.113954462 | 0.114544839 |
| 161 | 14-08-1981 | 0.110466316 | 0.110572040 |
| 162 | 17-08-1981 | 0.103487938 | 0.103724256 |
| 163 | 18-08-1981 | 0.098837076 | 0.098012693 |
| 164 | 19-08-1981 | 0.096511645 | 0.096333466 |
| 165 | 20-08-1981 | 0.098837076 | 0.098012693 |
| 166 | 21-08-1981 | 0.084884489 | 0.086253151 |
| 167 | 24-08-1981 | 0.073255249 | 0.071994245 |
| 168 | 25-08-1981 | 0.077908195 | 0.077785596 |
| 169 | 26-08-1981 | 0.074417965 | 0.075667128 |
| 170 | 27-08-1981 | 0.075580681 | 0.075993039 |
| 171 | 28-08-1981 | 0.084884489 | 0.086253151 |
| 172 | 31-08-1981 | 0.084884489 | 0.086389437 |
| 173 | 01-09-1981 | 0.096511645 | 0.096333466 |
| 174 | 02-09-1981 | 0.099999792 | 0.101090565 |
| 175 | 03-09-1981 | 0.089535351 | 0.089601688 |
| 176 | 04-09-1981 | 0.087209920 | 0.087448932 |
| 177 | 08-09-1981 | 0.081396342 | 0.081401840 |
| 178 | 09-09-1981 | 0.081396342 | 0.081401840 |
| 179 | 10-09-1981 | 0.082559058 | 0.082268246 |
| 180 | 11-09-1981 | 0.080233627 | 0.080682196 |
| 181 | 14-09-1981 | 0.074417965 | 0.075667128 |
| 182 | 15-09-1981 | 0.069767103 | 0.070206374 |
| 183 | 16-09-1981 | 0.066278956 | 0.066519298 |
| 184 | 17-09-1981 | 0.061628094 | 0.061064877 |
| 185 | 18-09-1981 | 0.062790809 | 0.061671834 |
| 186 | 21-09-1981 | 0.063953525 | 0.065074518 |
| 187 | 22-09-1981 | 0.054651800 | 0.055846587 |
| 188 | 23-09-1981 | 0.051163653 | 0.050915778 |
| 189 | 24-09-1981 | 0.050000938 | 0.049626790 |
| 190 | 25-09-1981 | 0.030232689 | 0.030165743 |
| 191 | 28-09-1981 | 0.031395405 | 0.030637948 |
| 192 | 29-09-1981 | 0.038371698 | 0.038100701 |
| 193 | 30-09-1981 | 0.039534414 | 0.039992332 |
| 194 | 01-10-1981 | 0.039534414 | 0.039677519 |



|     |            |             |             |
|-----|------------|-------------|-------------|
| 195 | 02-10-1981 | 0.051163653 | 0.050638188 |
| 196 | 05-10-1981 | 0.055814516 | 0.056059089 |
| 197 | 06-10-1981 | 0.054651800 | 0.055127718 |
| 198 | 07-10-1981 | 0.063953525 | 0.065074518 |
| 199 | 08-10-1981 | 0.069767103 | 0.070206374 |
| 200 | 09-10-1981 | 0.070929818 | 0.070751019 |
| 201 | 12-10-1981 | 0.076745480 | 0.077270120 |
| 202 | 13-10-1981 | 0.076745480 | 0.077270120 |
| 203 | 14-10-1981 | 0.066278956 | 0.066519298 |
| 204 | 15-10-1981 | 0.069767103 | 0.070206374 |
| 205 | 16-10-1981 | 0.067441671 | 0.067421712 |
| 206 | 19-10-1981 | 0.070929818 | 0.070751019 |
| 207 | 20-10-1981 | 0.080233627 | 0.080818482 |
| 208 | 21-10-1981 | 0.080233627 | 0.080818482 |
| 209 | 22-10-1981 | 0.079070911 | 0.079025008 |
| 210 | 23-10-1981 | 0.074417965 | 0.075803414 |
| 211 | 26-10-1981 | 0.074417965 | 0.075803414 |
| 212 | 27-10-1981 | 0.077908195 | 0.077921882 |
| 213 | 28-10-1981 | 0.083721773 | 0.082740232 |
| 214 | 29-10-1981 | 0.081396342 | 0.081538126 |
| 215 | 30-10-1981 | 0.083721773 | 0.082740232 |
| 216 | 02-11-1981 | 0.083721773 | 0.082740232 |
| 217 | 03-11-1981 | 0.081396342 | 0.081538126 |
| 218 | 04-11-1981 | 0.076745480 | 0.077133834 |
| 219 | 05-11-1981 | 0.063953525 | 0.065074518 |
| 220 | 06-11-1981 | 0.065116240 | 0.065582678 |
| 221 | 09-11-1981 | 0.067441671 | 0.067340598 |
| 222 | 10-11-1981 | 0.068604387 | 0.068151914 |
| 223 | 11-11-1981 | 0.073255249 | 0.072130531 |
| 224 | 12-11-1981 | 0.079070911 | 0.079025008 |
| 225 | 13-11-1981 | 0.066278956 | 0.066519298 |
| 226 | 16-11-1981 | 0.063953525 | 0.065074518 |
| 227 | 17-11-1981 | 0.067441671 | 0.067421712 |
| 228 | 18-11-1981 | 0.073255249 | 0.072130531 |
| 229 | 19-11-1981 | 0.073255249 | 0.072130531 |
| 230 | 20-11-1981 | 0.074417965 | 0.075803414 |
| 231 | 23-11-1981 | 0.066278956 | 0.066519298 |
| 232 | 24-11-1981 | 0.065116240 | 0.065663792 |
| 233 | 25-11-1981 | 0.068604387 | 0.068151914 |
| 234 | 27-11-1981 | 0.073255249 | 0.072130531 |
| 235 | 30-11-1981 | 0.070929818 | 0.070751019 |
| 236 | 01-12-1981 | 0.070929818 | 0.070751019 |
| 237 | 02-12-1981 | 0.072092534 | 0.071589865 |
| 238 | 03-12-1981 | 0.069767103 | 0.070206374 |
| 239 | 04-12-1981 | 0.074417965 | 0.075803414 |
| 240 | 07-12-1981 | 0.075580681 | 0.076129325 |
| 241 | 08-12-1981 | 0.072092534 | 0.071589865 |
| 242 | 09-12-1981 | 0.073255249 | 0.072130531 |
| 243 | 10-12-1981 | 0.073255249 | 0.072130531 |
| 244 | 11-12-1981 | 0.072092534 | 0.071589865 |
| 245 | 14-12-1981 | 0.066278956 | 0.066519298 |
| 246 | 15-12-1981 | 0.070929818 | 0.070751019 |
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| 885 | 25-06-1984 | 0.151163445 | 0.150382146 |
| 886 | 26-06-1984 | 0.139534205 | 0.141212597 |
| 887 | 27-06-1984 | 0.132557912 | 0.132803217 |
| 888 | 28-06-1984 | 0.143024436 | 0.143183842 |
| 889 | 29-06-1984 | 0.144187151 | 0.144205704 |
| 890 | 02-07-1984 | 0.136046059 | 0.135766566 |
| 891 | 03-07-1984 | 0.132557912 | 0.132803217 |
| 892 | 05-07-1984 | 0.127907049 | 0.127769738 |
| 893 | 06-07-1984 | 0.131395196 | 0.132013127 |
| 894 | 09-07-1984 | 0.141861720 | 0.142263889 |
| 895 | 10-07-1984 | 0.147675298 | 0.147377625 |
| 896 | 11-07-1984 | 0.144187151 | 0.144188255 |

|     |            |             |             |
|-----|------------|-------------|-------------|
| 897 | 12-07-1984 | 0.145349867 | 0.144677982 |
| 898 | 13-07-1984 | 0.143024436 | 0.143166393 |
| 899 | 16-07-1984 | 0.137208774 | 0.136767998 |
| 900 | 17-07-1984 | 0.137208774 | 0.136767998 |
| 901 | 18-07-1984 | 0.133720627 | 0.133865714 |
| 902 | 19-07-1984 | 0.133720627 | 0.133865714 |
| 903 | 20-07-1984 | 0.133720627 | 0.133865714 |
| 904 | 23-07-1984 | 0.131395196 | 0.132013127 |
| 905 | 24-07-1984 | 0.145349867 | 0.144677982 |
| 906 | 25-07-1984 | 0.146512583 | 0.147115022 |
| 907 | 26-07-1984 | 0.151163445 | 0.149790183 |
| 908 | 27-07-1984 | 0.150000729 | 0.149436831 |
| 909 | 30-07-1984 | 0.134883343 | 0.134777695 |
| 910 | 31-07-1984 | 0.134883343 | 0.134777695 |
| 911 | 01-08-1984 | 0.130232481 | 0.129734904 |
| 912 | 02-08-1984 | 0.122093471 | 0.122976325 |
| 913 | 03-08-1984 | 0.152326160 | 0.152947336 |
| 914 | 06-08-1984 | 0.169766894 | 0.167716026 |
| 915 | 07-08-1984 | 0.173255041 | 0.174094051 |
| 916 | 08-08-1984 | 0.162790601 | 0.163484484 |
| 917 | 09-08-1984 | 0.174419840 | 0.174614608 |
| 918 | 10-08-1984 | 0.162790601 | 0.163781971 |
| 919 | 13-08-1984 | 0.176745272 | 0.175930366 |
| 920 | 14-08-1984 | 0.166278748 | 0.165690064 |
| 921 | 15-08-1984 | 0.156977023 | 0.158550844 |
| 922 | 16-08-1984 | 0.159302454 | 0.159100711 |
| 923 | 17-08-1984 | 0.153488876 | 0.153445616 |
| 924 | 20-08-1984 | 0.152326160 | 0.153130397 |
| 925 | 21-08-1984 | 0.162790601 | 0.164013356 |
| 926 | 22-08-1984 | 0.158139738 | 0.158788994 |
| 927 | 23-08-1984 | 0.159302454 | 0.159100711 |
| 928 | 24-08-1984 | 0.159302454 | 0.159100711 |
| 929 | 27-08-1984 | 0.156977023 | 0.158550844 |
| 930 | 28-08-1984 | 0.160465170 | 0.160669103 |
| 931 | 29-08-1984 | 0.153488876 | 0.153445616 |
| 932 | 30-08-1984 | 0.148838014 | 0.148861632 |
| 933 | 31-08-1984 | 0.144187151 | 0.144205704 |
| 934 | 04-09-1984 | 0.141861720 | 0.142281339 |
| 935 | 05-09-1984 | 0.141861720 | 0.142281339 |
| 936 | 06-09-1984 | 0.144187151 | 0.144205704 |
| 937 | 07-09-1984 | 0.144187151 | 0.144205704 |
| 938 | 10-09-1984 | 0.143024436 | 0.143183842 |
| 939 | 11-09-1984 | 0.147675298 | 0.147395074 |
| 940 | 12-09-1984 | 0.140696921 | 0.141063198 |
| 941 | 13-09-1984 | 0.153488876 | 0.153262556 |
| 942 | 14-09-1984 | 0.156977023 | 0.157893449 |
| 943 | 17-09-1984 | 0.163953316 | 0.163956404 |
| 944 | 18-09-1984 | 0.154651592 | 0.154046386 |
| 945 | 19-09-1984 | 0.148838014 | 0.148844182 |
| 946 | 20-09-1984 | 0.150000729 | 0.149436831 |
| 947 | 21-09-1984 | 0.147675298 | 0.147377625 |
| 948 | 24-09-1984 | 0.145349867 | 0.144695431 |
| 949 | 25-09-1984 | 0.140696921 | 0.141552225 |
| 950 | 26-09-1984 | 0.137208774 | 0.136679038 |

|      |            |             |             |
|------|------------|-------------|-------------|
| 951  | 27-09-1984 | 0.137208774 | 0.136679038 |
| 952  | 28-09-1984 | 0.131395196 | 0.132081002 |
| 953  | 01-10-1984 | 0.125581618 | 0.125663027 |
| 954  | 02-10-1984 | 0.127907049 | 0.127701864 |
| 955  | 03-10-1984 | 0.131395196 | 0.132013127 |
| 956  | 04-10-1984 | 0.133720627 | 0.133865714 |
| 957  | 05-10-1984 | 0.129069765 | 0.128829420 |
| 958  | 08-10-1984 | 0.129069765 | 0.128829420 |
| 959  | 09-10-1984 | 0.126744334 | 0.126568824 |
| 960  | 10-10-1984 | 0.119768040 | 0.119732022 |
| 961  | 11-10-1984 | 0.118605325 | 0.119387679 |
| 962  | 12-10-1984 | 0.109303600 | 0.109310083 |
| 963  | 15-10-1984 | 0.120930756 | 0.120405354 |
| 964  | 16-10-1984 | 0.119768040 | 0.119732022 |
| 965  | 17-10-1984 | 0.129069765 | 0.128829420 |
| 966  | 18-10-1984 | 0.136046059 | 0.135855526 |
| 967  | 19-10-1984 | 0.136046059 | 0.135855526 |
| 968  | 22-10-1984 | 0.133720627 | 0.133865714 |
| 969  | 23-10-1984 | 0.139534205 | 0.140723571 |
| 970  | 24-10-1984 | 0.141861720 | 0.142263889 |
| 971  | 25-10-1984 | 0.132557912 | 0.132735342 |
| 972  | 26-10-1984 | 0.126744334 | 0.126568824 |
| 973  | 29-10-1984 | 0.127907049 | 0.127701864 |
| 974  | 30-10-1984 | 0.130232481 | 0.129734904 |
| 975  | 31-10-1984 | 0.129069765 | 0.128829420 |
| 976  | 01-11-1984 | 0.130232481 | 0.129734904 |
| 977  | 02-11-1984 | 0.129069765 | 0.128829420 |
| 978  | 05-11-1984 | 0.127907049 | 0.127701864 |
| 979  | 06-11-1984 | 0.141861720 | 0.142263889 |
| 980  | 07-11-1984 | 0.137208774 | 0.136767998 |
| 981  | 08-11-1984 | 0.127907049 | 0.127701864 |
| 982  | 09-11-1984 | 0.113954462 | 0.114544839 |
| 983  | 12-11-1984 | 0.122093471 | 0.122976325 |
| 984  | 13-11-1984 | 0.116279894 | 0.115583502 |
| 985  | 14-11-1984 | 0.118605325 | 0.119565576 |
| 986  | 15-11-1984 | 0.118605325 | 0.119387679 |
| 987  | 16-11-1984 | 0.113954462 | 0.114544839 |
| 988  | 19-11-1984 | 0.101162507 | 0.101727605 |
| 989  | 20-11-1984 | 0.108138801 | 0.108117759 |
| 990  | 21-11-1984 | 0.112791747 | 0.111801654 |
| 991  | 23-11-1984 | 0.118605325 | 0.119565576 |
| 992  | 26-11-1984 | 0.120930756 | 0.120227456 |
| 993  | 27-11-1984 | 0.126744334 | 0.126568824 |
| 994  | 28-11-1984 | 0.138371490 | 0.137314588 |
| 995  | 29-11-1984 | 0.133720627 | 0.133865714 |
| 996  | 30-11-1984 | 0.127907049 | 0.127701864 |
| 997  | 03-12-1984 | 0.124418903 | 0.124170758 |
| 998  | 04-12-1984 | 0.129069765 | 0.128829420 |
| 999  | 05-12-1984 | 0.140696921 | 0.141063198 |
| 1000 | 06-12-1984 | 0.152326160 | 0.152947336 |

XGBoost Predicted Close Prices

