stock prediction using time series

```r
library(quantmod)
```

```
## Loading required package: xts
```

```
## Loading required package: zoo
```

```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

```
## Loading required package: TTR
```

```
## Registered S3 method overwritten by 'quantmod':
##   method            from
##   as.zoo.data.frame zoo
```

```r
library(forecast)
```

```r
nifty <- getSymbols(
  "^NSEI",
  src = "yahoo",
  from = "2015-01-01",
  to = "2025-03-31",
  auto.assign = FALSE
)
```

```
## Warning: ^NSEI contains missing values. Some functions will not work if objects
## contain missing values in the middle of the series. Consider using na.omit(),
## na.approx(), na.fill(), etc to remove or replace them.
```

```r
nifty_ac <- getSymbols(
  "^NSEI",
  src = "yahoo",
  from = "2025-04-01",
  to = Sys.Date(),
  auto.assign = FALSE
)
```

```r
head(nifty)
```

```
##            NSEI.Open NSEI.High NSEI.Low NSEI.Close NSEI.Volume NSEI.Adjusted
## 2015-01-02  8288.70   8410.60  8288.70    8395.45      101900       8395.45
## 2015-01-05  8407.95   8445.60  8363.90    8378.40      118200       8378.40
## 2015-01-06  8325.30   8327.85  8111.35    8127.35      172800       8127.35
## 2015-01-07  8118.65   8151.20  8065.45    8102.10      164100       8102.10
## 2015-01-08  8191.40   8243.50  8167.30    8234.60      143800       8234.60
## 2015-01-09  8285.45   8303.30  8190.80    8284.50      148000       8284.50
```

```r
tail(nifty)
```

```
##            NSEI.Open NSEI.High NSEI.Low NSEI.Close NSEI.Volume NSEI.Adjusted
## 2025-03-21 23168.25  23402.70  23132.8   23350.40      541000      23350.40
## 2025-03-24 23515.40  23708.75  23433.5   23658.35      311900      23658.35
## 2025-03-25 23751.50  23869.60  23601.4   23668.65      338200      23668.65
## 2025-03-26 23700.95  23736.50  23451.7   23486.85      278600      23486.85
## 2025-03-27 23433.95  23646.45  23412.2   23591.95      510300      23591.95
## 2025-03-28 23600.40  23649.20  23450.2   23519.35      295400      23519.35
```

```r
str(nifty)
```

```
## An xts object on 2015-01-02 / 2025-03-28 containing:
##   Data:     double [2529, 6]
##   Columns: NSEI.Open, NSEI.High, NSEI.Low, NSEI.Close, NSEI.Volume ... with 1 more column
##   Index:    Date [2529] (TZ: "UTC")
##   xts Attributes:
##     $ src     : chr "yahoo"
##     $ updated: POSIXct[1:1], format: "2025-06-16 06:23:47"
```

```r
str(nifty_ac)
```

```
## An xts object on 2025-04-01 / 2025-06-13 containing:
##   Data:     double [50, 6]
##   Columns: NSEI.Open, NSEI.High, NSEI.Low, NSEI.Close, NSEI.Volume ... with 1 more column
##   Index:    Date [50] (TZ: "UTC")
##   xts Attributes:
##     $ src     : chr "yahoo"
##     $ updated: POSIXct[1:1], format: "2025-06-16 06:23:47"
```

```r
nifty <- na.omit(nifty)
nifty_ac <- na.omit(nifty_ac)
```
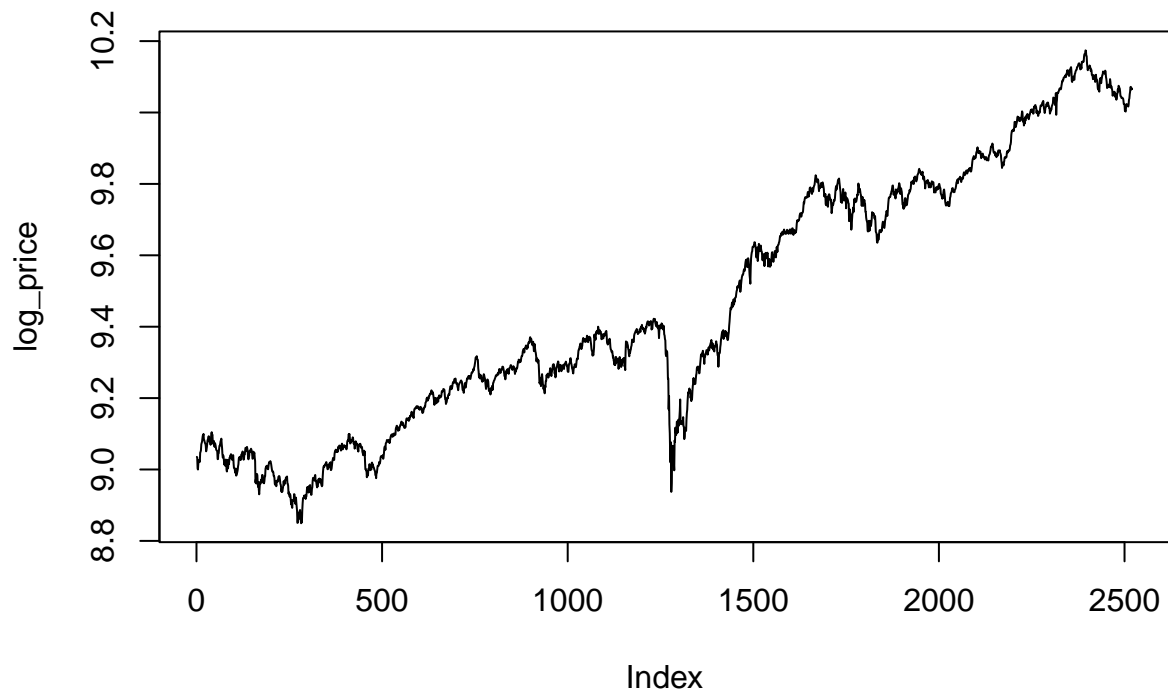
```r
price <- data.frame(nifty$NSEI.Close)
plot(price$NSEI.Close, type = "l", main = "NIFTY Closing Price")
```

NIFTY Closing Price
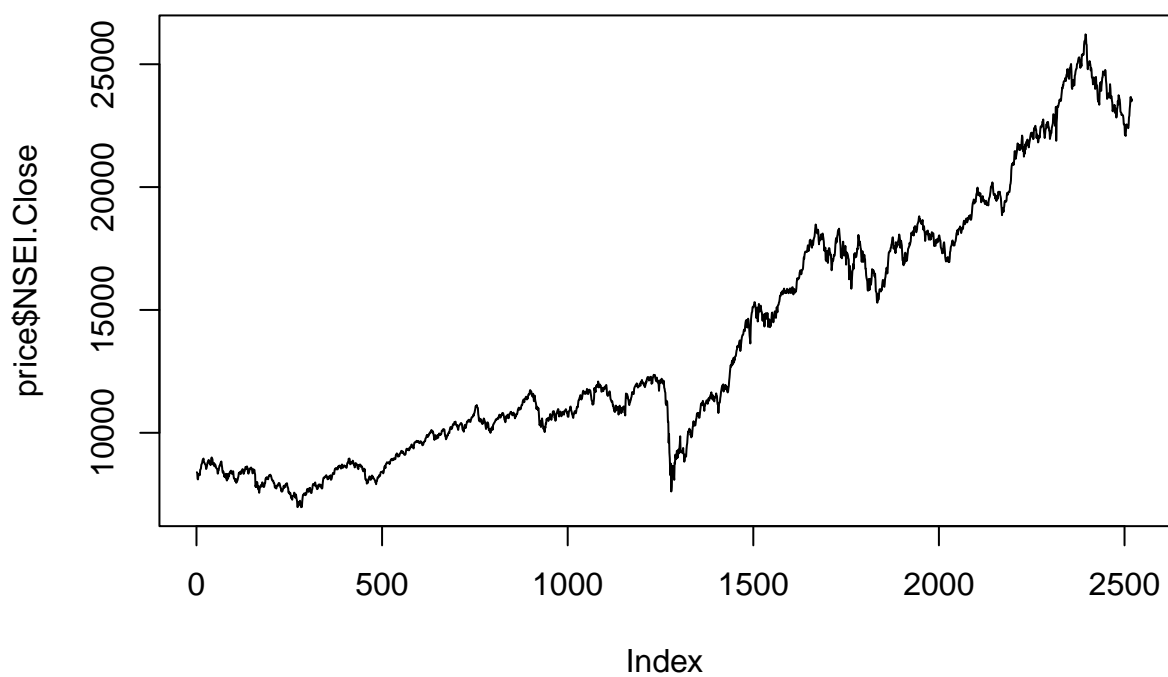

```r
log_price <- log(price$NSEI.Close)
plot(log_price, type = "l", main = "Log of NIFTY Closing Price")
```

Log of NIFTY Closing Price


```r
ts_price <- auto.arima(log_price)
ts_price
```

```
## Series: log_price
## ARIMA(4,1,5) with drift
##
## Coefficients:
##           ar1      ar2      ar3      ar4     ma1     ma2     ma3     ma4
##       -1.3287  -0.8748  -0.2135  -0.2165  1.3255  0.8819  0.2340  0.2692
## s.e.   0.2428   0.4394   0.4703   0.2689  0.2420  0.4372  0.4676  0.2785
##          ma5  drift
##       0.0906  4e-04
## s.e.  0.0264  2e-04
##
## sigma^2 = 0.0001069:  log likelihood = 7947.77
## AIC=-15873.53   AICc=-15873.43   BIC=-15809.39
```
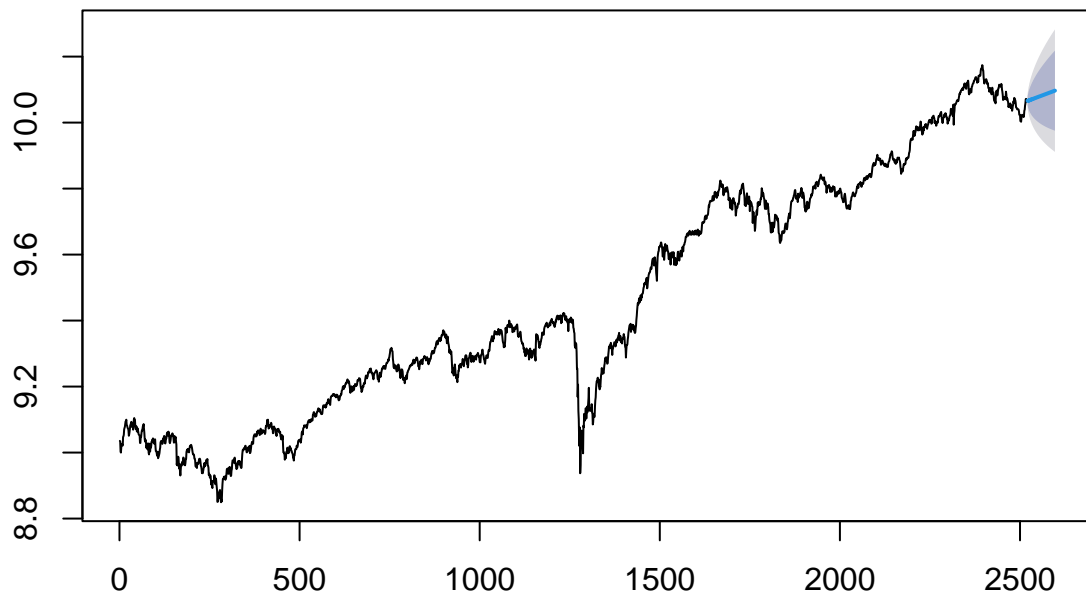
```r
plot(ts_price$residuals, main = "Residuals of ARIMA Model")
```

Residuals of ARIMA Model
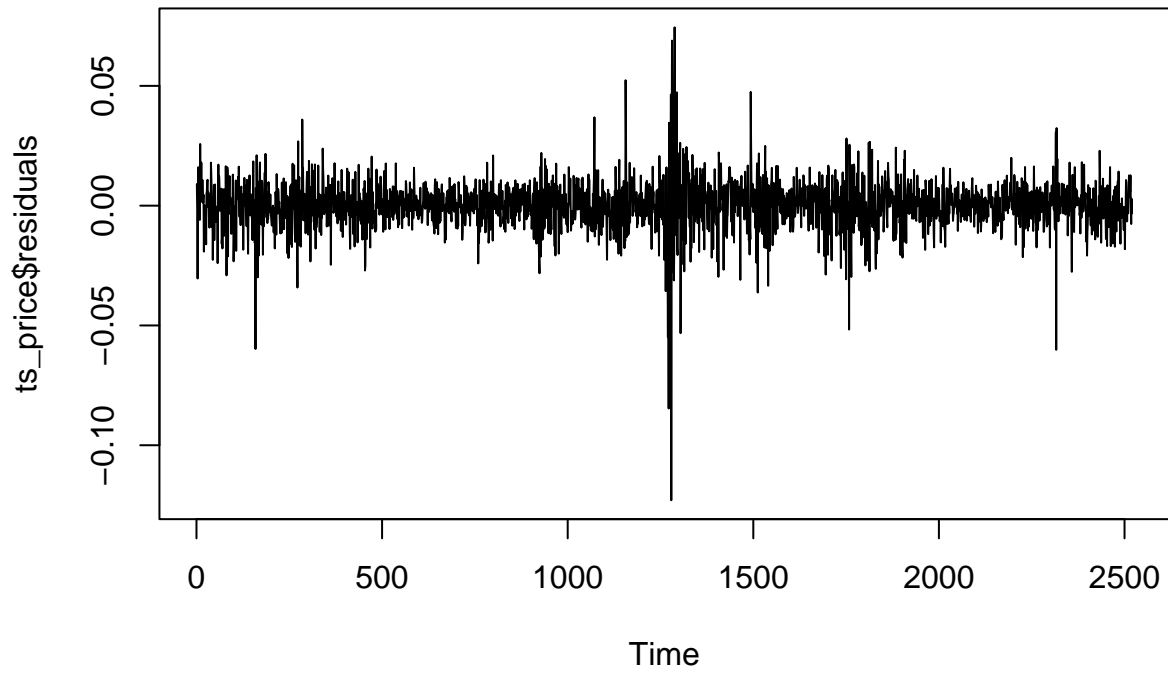

```r
horizon <- length(seq.Date(from = as.Date("2025-04-01"), to = Sys.Date(), by = "day"))
forcast <- forecast(ts_price, h = horizon)
plot(forcast, main = "Forecast vs Actual")
```
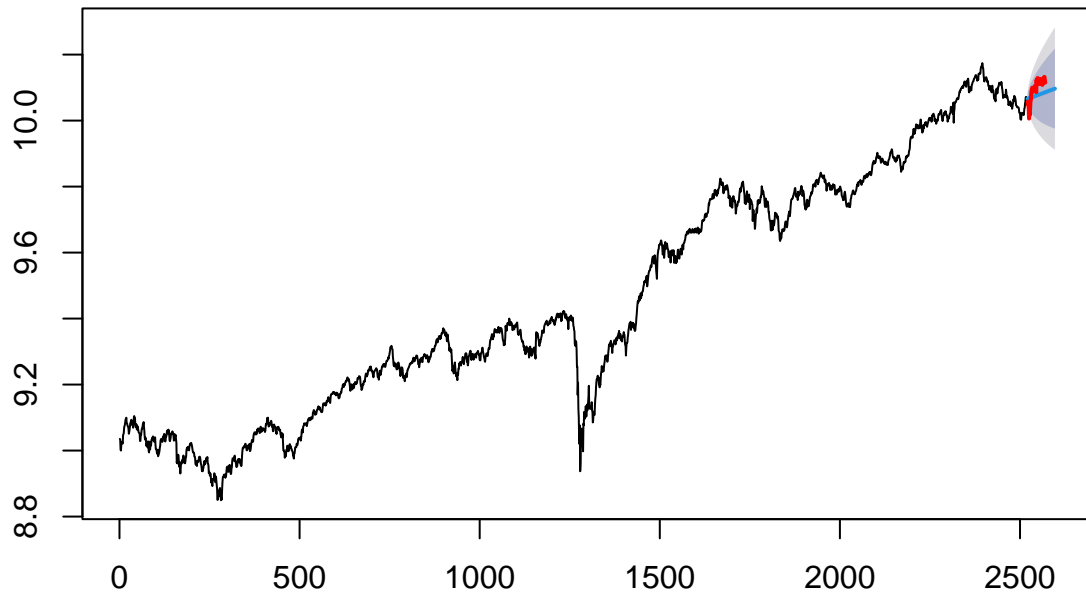
Forecast vs Actual


```r
plot(forcast, main = "Forecast vs Actual")

time_forcast <- time(forcast$mean)
actual_y <- as.numeric(log(nifty_ac$NSEI.Close))
time_obs <- time_forcast[1:length(actual_y)]
lines(time_obs, actual_y, col = "red", lwd = 2, type = "l")
```

Forecast vs Actual


```r
fc_actual <- exp(data.frame(forcast))
head(fc_actual)
```

```
##      Point.Forecast    Lo.80    Hi.80    Lo.95    Hi.95
## 2521       23533.29 23223.58 23847.13 23061.28 24014.96
## 2522       23528.55 23092.54 23972.79 22865.01 24211.35
## 2523       23534.76 23000.00 24081.96 22721.85 24376.76
## 2524       23564.28 22944.88 24200.41 22623.60 24544.08
## 2525       23545.89 22849.00 24264.03 22488.48 24653.02
## 2526       23579.38 22806.68 24378.25 22407.95 24812.04
```

```r
plot(fc_actual$Point.Forecast, main = "Forecasted NIFTY Price (Original Scale)" , type = "l")
```

Forecasted NIFTY Price (Original Scale)