**EXPERIMENT-4**

**Apply analytics for forecasting and inventory planning for a large retailer**

**Program:**

install.packages("forecast")

install.packages("ggplot2")

install.packages("readr")

library(forecast)

library(ggplot2)

library(readr)

data <- read\_csv("retail\_forecasting\_inventory\_data.csv")

head(data)

data$Month <- as.Date(data$Month)

ts\_employee <- ts(data$Hourly\_Employees\_Required, start = c(2020, 1), frequency = 12)

ts\_inventory <- ts(data$Inventory\_Units\_Required, start = c(2020, 1), frequency = 12)

plot(ts\_employee, main = "Monthly Hourly Employees Needed", col = "blue", ylab = "Employees", xlab = "Year")

plot(ts\_inventory, main = "Monthly Inventory Units Needed", col = "darkgreen", ylab = "Inventory Units", xlab = "Year")

model\_employee <- auto.arima(ts\_employee)

model\_inventory <- auto.arima(ts\_inventory)

summary(model\_employee)

summary(model\_inventory)

forecast\_employee <- forecast(model\_employee, h = 24)

forecast\_inventory <- forecast(model\_inventory, h = 24)

plot(forecast\_employee, main = "Forecast: Hourly Employee Demand")

plot(forecast\_inventory, main = "Forecast: Inventory Requirements")

autoplot(forecast\_employee) +ggtitle("Hourly Employee Demand Forecast") +

ylab("Employees") + xlab("Year")

autoplot(forecast\_inventory) + ggtitle("Inventory Forecast") +

ylab("Inventory Units") + xlab("Year")

future\_months <- seq(as.Date("2025-01-01"), by = "month", length.out = 24)

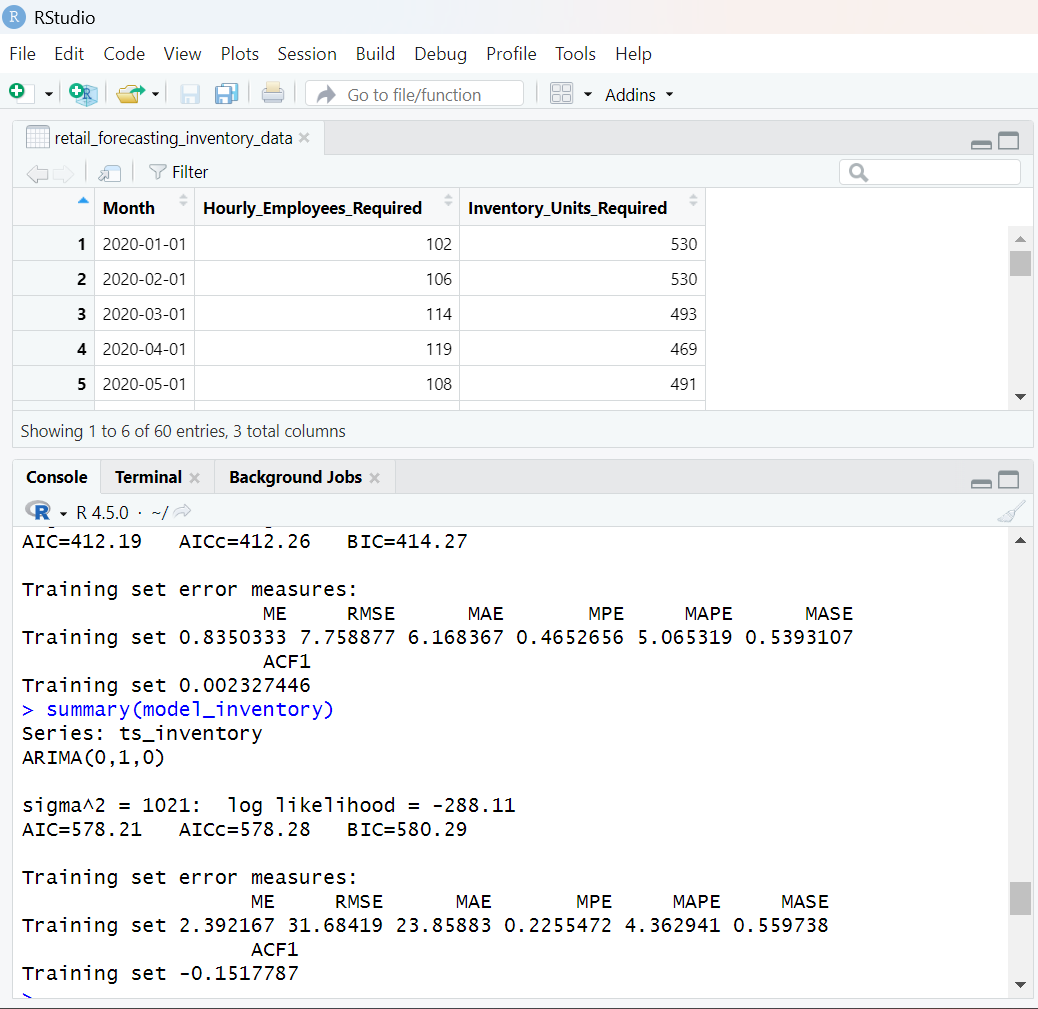
forecast\_df <- data.frame(Month = future\_months,

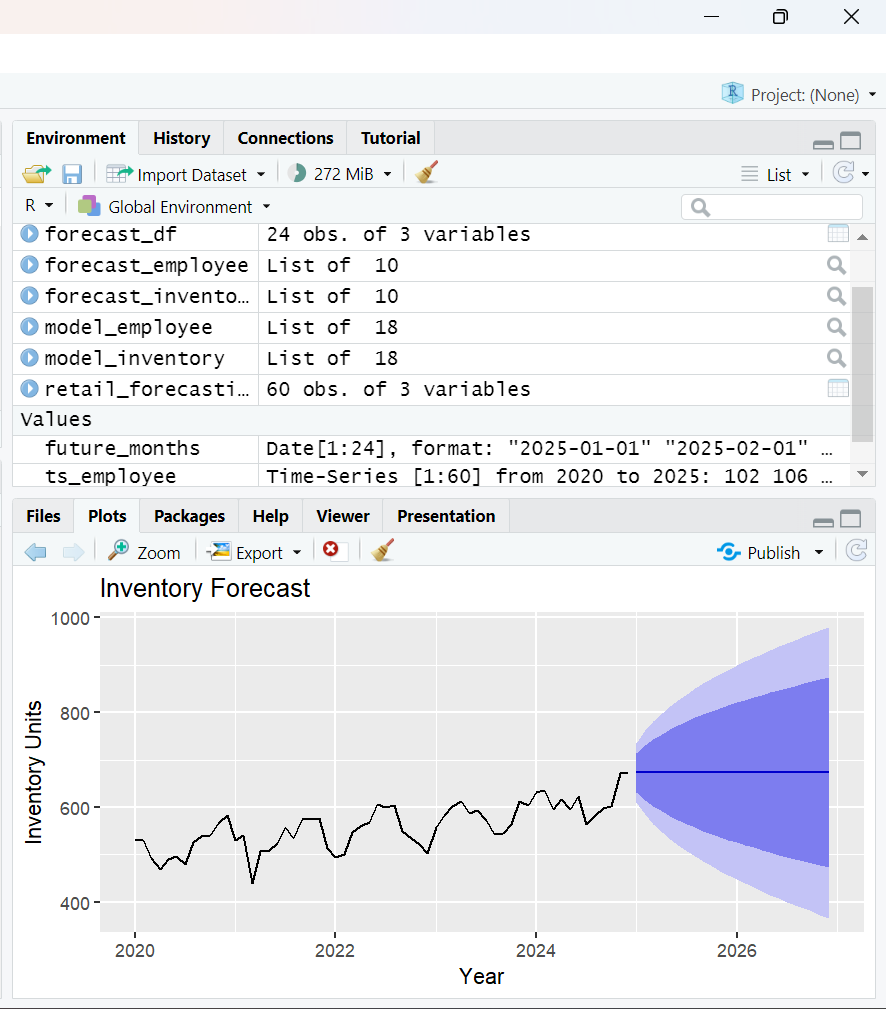
Forecasted\_Employees = round(forecast\_employee$mean),

Forecasted\_Inventory = round(forecast\_inventory$mean))

write.csv(forecast\_df, "forecast\_output\_retail.csv", row.names = FALSE)

**Output:**

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