**Steps for Machine learning:**

**Step 1 :** install following libraries in R for plotting the data and cleaning the data

install.packages("dplyr")

install.packages("tidyr")

installed.packages("ggplot2")

**Step 2 :** deploy the installed libraries:

library("dplyr")

library("tidyr")

library("ggplot2")  
  
**Step 3 :** extract csv into a dataframe  
cloud\_house\_data <- read.csv(file="C:/Users/parth/OneDrive/Documents/DCU/Cloud/Final\_Data.csv", sep=",", header=TRUE)

**Step 4 :** filter the dataframe to select the county for which the graph is to be plotted using the filter method of dplyr

d1 <- filter(cloud\_house\_data, Area == "Dublin1")

**Step 5 :** combine the year and quarter column for plotting the trend data in quarterly fashion:

d1<- d1 %>% unite("yearqtr", Year:Quarter, sep = "-")

**Step 6 :** command to plot 1BHK trends for the Dublin 1 quarterly data and to export the plot as png and a certain location.

myplot <- ggplot(data = d1, aes(x=yearqtr, y=X1\_Bed\_Avg\_monthly\_rent, group=1)) +

geom\_line() + labs(title="1 BHK quarterly trends", y="1 BHK Prices",x="Quarters")

myplot <- myplot + theme(axis.text.x = element\_text(angle = -45, hjust = 0.001))

png(file="C:/Users/parth/OneDrive/Documents/DCU/Cloud/trendplots/Dublin24\_1bhk\_trend.png")

myplot

dev.off()

**Step 7 :** create a time series dataframe with frequency 4 for quarterly data and start parameter determines the start year and month.

X <- ts(data = rev(d1$X1\_Bed\_Avg\_monthly\_rent), frequency = 4, start = c(2015,1))

**Step 8** : to plot the forecast we will use auto arima to detect the accurate arima model for the timeseries data. Then forecast this model for 10 months of data using forecast method. Finally, we plot the data and save the data as png using autoplot and png method.

model <- auto.arima(x)

future <- forecast(model,10)

png(filename="C:/Users/parth/OneDrive/Documents/DCU/Cloud/trendplots/Dublin24\_1bhk\_forecast.png")

plot(future,showgap = FALSE, ylab = "1 bhk house price", xlab = "Time", main = "Arima forecast for Dublin24 1BHK")

dev.off()

**Step 9:** similarly, we can plot the data for rest of the counties and the number of bhk following the above step from step 5 and selecting the appropriate filter in step 4