

# Swarn Singh 3/24/2023

## Group 11 Part 4 of the assignment - Dimensionality reduction

```
# Load required libraries  
library(caret)
```

```
## Loading required package: ggplot2
```

```
## Loading required package: lattice
```

```
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
```

```
library(ggplot2)  
library(nnet) # Added for multinomial logistic regression
```

We will be using this dataset: <https://www.kaggle.com/datasets/anmolkumar/house-price-prediction-challenge> (<https://www.kaggle.com/datasets/anmolkumar/house-price-prediction-challenge>)

```
# -----  
# Load the data and perform initial data exploration  
# -----  
  
# Load the data  
df <- read.csv("train.csv")
```

```
# Set the seed for reproducibility
set.seed(1234)

# Split the data into train and test sets
i <- sample(1:nrow(df), nrow(df) * 0.8, replace = FALSE)
train <- df[i, ]
test <- df[-i, ]
```

```
# -----
# Perform PCA on the dataset
# -----

# Select only numeric columns for train
numeric_columns_train <- sapply(train, is.numeric)
pca_train <- train[, numeric_columns_train]

# Select only numeric columns for test
numeric_columns_test <- sapply(test, is.numeric)
pca_test <- test[, numeric_columns_test]

# Calculate the correlation matrix
cor(pca_train)
```

```
##          UNDER_CONSTRUCTION          RERA          BHK_NO.
## UNDER_CONSTRUCTION          1.000000000  0.361728508 -0.041073381
## RERA          0.361728508  1.000000000  0.008237080
## BHK_NO.      -0.041073381  0.008237080  1.000000000
## SQUARE_FT    -0.004745817 -0.007018417  0.005859245
## READY_TO_MOVE -1.000000000 -0.361728508  0.041073381
## RESALE        -0.347487189 -0.267181265  0.017314520
## LONGITUDE     0.008051427  0.109646924  0.068948294
## LATITUDE      0.004102830 -0.057603748  0.044238646
## TARGET.PRICE_IN_LACS. 0.053285888  0.064323456  0.115352450
##          SQUARE_FT READY_TO_MOVE          RESALE          LONGITUDE
## UNDER_CONSTRUCTION -0.0047458169 -1.000000000 -0.34748719  0.008051427
## RERA                -0.0070184170 -0.361728508 -0.26718127  0.109646924
## BHK_NO.             0.0058592452  0.041073381  0.01731452  0.068948294
## SQUARE_FT          1.0000000000  0.004745817  0.00212955 -0.014161205
## READY_TO_MOVE       0.0047458169  1.000000000  0.34748719 -0.008051427
## RESALE              0.0021295502  0.347487189  1.00000000  0.022552296
## LONGITUDE          -0.0141612053 -0.008051427  0.02255230  1.000000000
## LATITUDE            0.0009355717 -0.004102830  0.01529058 -0.167095295
## TARGET.PRICE_IN_LACS. 0.4429297866 -0.053285888 -0.19683851 -0.033026736
##          LATITUDE TARGET.PRICE_IN_LACS.
## UNDER_CONSTRUCTION 0.0041028297          0.05328589
## RERA                -0.0576037479          0.06432346
## BHK_NO.             0.0442386465          0.11535245
## SQUARE_FT          0.0009355717          0.44292979
## READY_TO_MOVE       -0.0041028297          -0.05328589
## RESALE              0.0152905825          -0.19683851
## LONGITUDE          -0.1670952947          -0.03302674
## LATITUDE            1.0000000000          -0.01475222
## TARGET.PRICE_IN_LACS. -0.0147522160          1.00000000
```

```
# Pre-process PCA
```

```
pca_out <- preProcess(pca_train, method = c("center", "scale", "pca"))
pca_out
```

```
## Created from 23560 samples and 9 variables
```

```
##
```

```
## Pre-processing:
```

```
## - centered (9)
```

```
## - ignored (0)
```

```
## - principal component signal extraction (9)
```

```
## - scaled (9)
```

```
##
```

```
## PCA needed 8 components to capture 95 percent of the variance
```

```

# Apply PCA
train_pc <- predict(pca_out, pca_train)
test_pc <- predict(pca_out, pca_test)

# Extract the 'POSTED_BY' column from train and test datasets
train_df <- train[, "POSTED_BY"]
test_df <- test[, "POSTED_BY"]

# Add the 'POSTED_BY' column to the train_pc and test_pc datasets
train_pc$POSTED_BY <- train_df
test_pc$POSTED_BY <- test_df

# Rename the datasets
train_dfNew <- train_pc
test_dfNew <- test_pc

```

Observing the correlation matrix output, we can identify some notable correlations: 1.

UNDER\_CONSTRUCTION and READY\_TO\_MOVE have a perfect negative correlation (-1), meaning when one variable increases, the other decreases proportionally. This relationship is expected, as a property is either under construction or ready to move in, but not both. 2. RERA has a positive correlation with UNDER\_CONSTRUCTION (0.36) and a negative correlation with READY\_TO\_MOVE (-0.36). This could indicate that properties registered under the RERA are more likely to be under construction. 3. TARGET.PRICE\_IN\_LACS. has a moderate positive correlation with SQUARE\_FT (0.44), suggesting that as the square footage of a property increases, the target price also tends to increase.

Based on these insights, we can proceed with PCA or further data exploration and preprocessing to better understand the relationships between variables and their impact on the target variable.

```

# -----
# Check for missing values in the dataset
# -----

sapply(df, function(x) sum(is.na(x) == TRUE))

```

```

##          POSTED_BY    UNDER_CONSTRUCTION          RERA
##              0              0              0
##          BHK_NO.      BHK_OR_RK      SQUARE_FT
##              0              0              0
##          READY_TO_MOVE    RESALE      ADDRESS
##              0              0              0
##          LONGITUDE    LATITUDE TARGET.PRICE_IN_LACS.
##              0              0              0

```

The output shows that there are no missing values in the dataset.

```
# -----
# Fit multinomial logistic regression model on PCA-transformed data
# -----

multinom_model <- multinom(POSTED_BY ~ ., data = train_dfNew)
```

```
## # weights: 30 (18 variable)
## initial value 25883.305521
## iter 10 value 16567.810107
## iter 20 value 14523.374796
## iter 30 value 13415.747462
## iter 40 value 13363.706306
## iter 50 value 13363.671435
## final value 13363.489919
## converged
```

```
summary(multinom_model)
```

```
## Call:
## multinom(formula = POSTED_BY ~ ., data = train_dfNew)
##
## Coefficients:
##      (Intercept)      PC1      PC2      PC3      PC4      PC5
## Dealer      8.954201 -0.7092938 -0.227299 -0.36413083 -0.2858228 1.472664
## Owner      7.225698 -2.3903984 -3.784798  0.01171308  0.4582906 4.731383
##      PC6      PC7      PC8
## Dealer -0.1925916 1.338478  0.9567039
## Owner -0.4522976 3.099070 -8.8833581
##
## Std. Errors:
##      (Intercept)      PC1      PC2      PC3      PC4      PC5
## Dealer  0.9307416 0.09763973 0.1457515 0.05404108 0.07122852 0.1900337
## Owner  0.9313860 0.10463493 0.1733763 0.05595276 0.07479884 0.2082052
##      PC6      PC7      PC8
## Dealer 0.08252738 0.1373996 0.1641817
## Owner  0.08513906 0.1478017 0.3137080
##
## Residual Deviance: 26726.98
## AIC: 26762.98
```

```
# Predict on the test set
test_pred <- predict(multinom_model, newdata = test_dfNew)

# Calculate accuracy
accuracy <- mean(test_pred == test_dfNew$POSTED_BY)
accuracy
```

```
## [1] 0.720421
```

```
# -----  
# Create a confusion matrix  
# -----  
  
table(Predicted = test_pred, Actual = test_dfNew$POSTED_BY)
```

```
##           Actual  
## Predicted Builder Dealer Owner  
##   Builder      14      12      3  
##   Dealer     124    2896    750  
##   Owner        2     756   1334
```

We fit a multinomial logistic regression model to predict the 'POSTED\_BY' variable using the principal components (PCs) obtained from PCA as features. The model's summary output provides the following information:

### Coefficients:

The coefficients for the Dealer and Owner categories are shown relative to the reference category (Builder). The negative coefficients for PC1 and PC2 in both categories suggest that as the values of these components increase, the likelihood of the property being posted by a dealer or an owner decreases relative to the likelihood of it being posted by a builder.

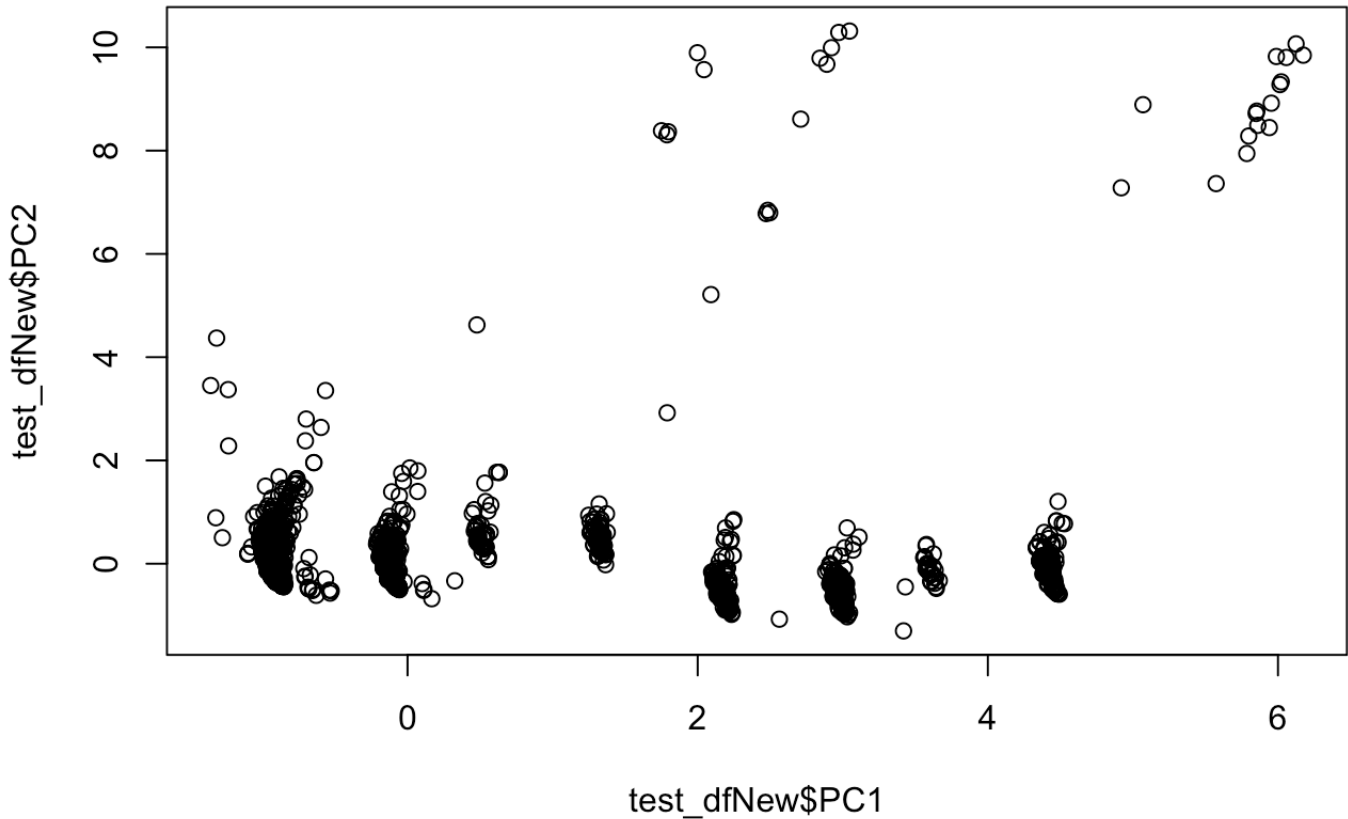
### Std. Errors:

The standard errors for each coefficient estimate are also provided. Smaller values indicate greater precision in the coefficient estimates. For instance, the standard error for the Dealer's PC1 coefficient is smaller than that for the Owner's PC1 coefficient, suggesting that the Dealer's coefficient is estimated with greater precision.

### Residual Deviance and AIC:

The residual deviance is a measure of the model's goodness of fit. A smaller value indicates a better-fitting model. In this case, the residual deviance is 26726.98. The Akaike Information Criterion (AIC) is another measure of the model's fit that takes into account both the goodness of fit and the model complexity. A smaller AIC value indicates a better-fitting model. The AIC for our multinomial logistic regression model is 26762.98.

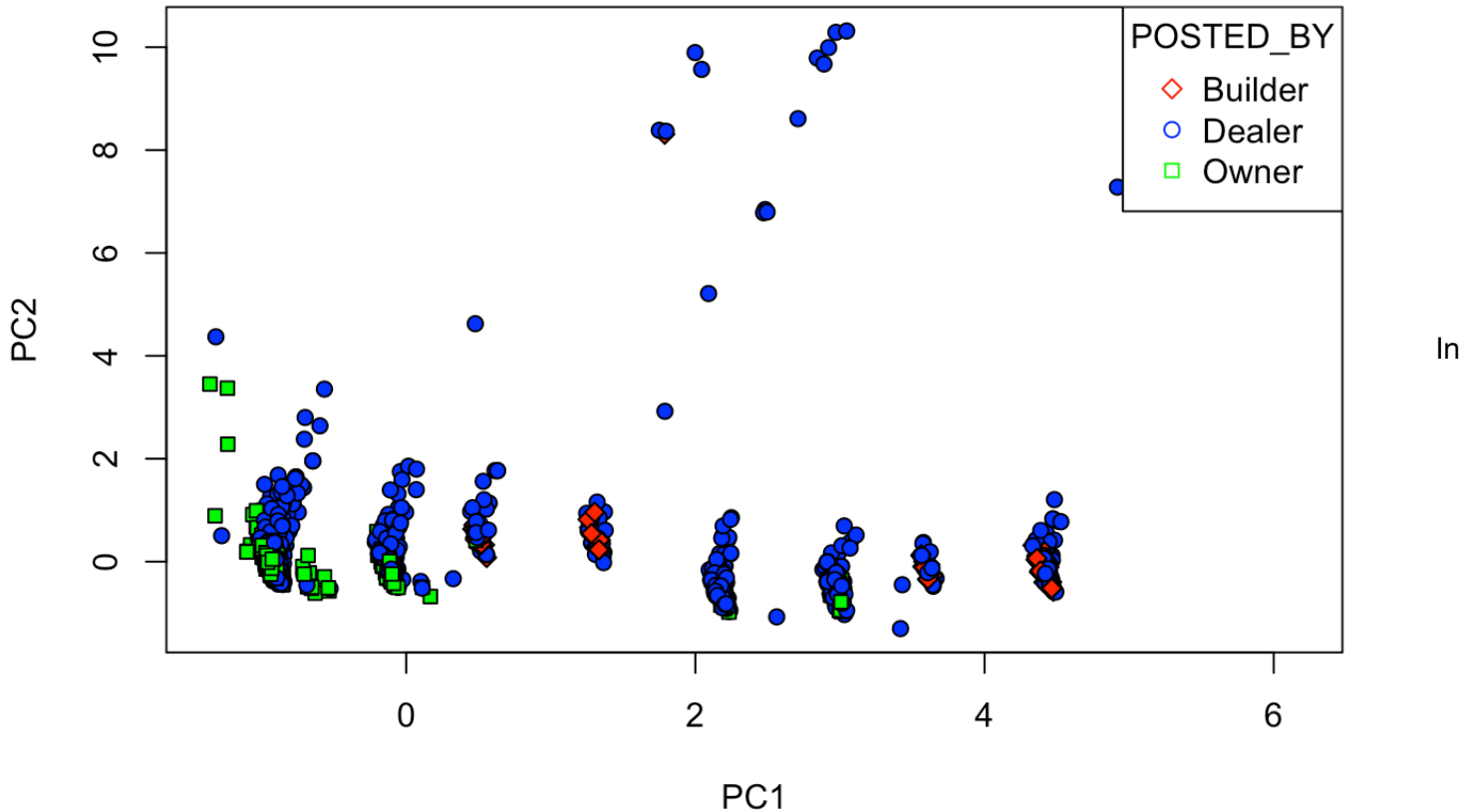
```
# -----  
# Plot PCA results  
# -----  
  
#PCA Plot  
plot(test_dfNew$PC1, test_dfNew$PC2, pch=c(23,21,22)[unclass(test_dfNew$dpmn)], bg=c(  
"red", "green", "blue"))
```



```
# Assign colors and shapes based on the 'POSTED_BY' column
colors <- c("red", "blue", "green")
shapes <- c(23, 21, 22)
color_mapping <- colors[as.numeric(as.factor(test_dfNew$POSTED_BY))]
shape_mapping <- shapes[as.numeric(as.factor(test_dfNew$POSTED_BY))]

# Plot PC1 and PC2 with colors and shapes according to the 'POSTED_BY' column
plot(test_dfNew$PC1, test_dfNew$PC2, pch = shape_mapping, bg = color_mapping, xlab =
"PC1", ylab = "PC2")

# Add a legend
legend("topright", legend = levels(as.factor(test_dfNew$POSTED_BY)), pch = shapes, co
l = colors, title = "POSTED_BY")
```



this section, we create a scatter plot of the first two principal components (PC1 and PC2) of the test dataset. The plot helps us visualize the relationships between the observations in a lower-dimensional space. The points on the plot are color-coded based on the 'POSTED\_BY' category (Dealer, Owner, or Builder).

From the plot, we can observe the following patterns:

1. Observe how well the points are clustered or separated based on the 'POSTED\_BY' category. If the clusters are well-separated, it indicates that PC1 and PC2 capture a significant amount of the variance in the 'POSTED\_BY' variable. On the other hand, if the clusters overlap, it might be necessary to include more principal components or use a different modeling approach.
2. Examine the spread of points within each cluster. A tighter cluster suggests that the observations within that category are more similar to each other, while a more dispersed cluster indicates greater variability within the category.

```
# -----
# Perform Random
# -----
# Forest classification on the original data
# -----

# Load required library
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:dplyr':  
##  
##      combine
```

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

```
# Convert the 'POSTED_BY' column to a factor  
train$POSTED_BY <- as.factor(train$POSTED_BY)  
test$POSTED_BY <- as.factor(test$POSTED_BY)  
  
# Fit a Random Forest model on the original train dataset  
rf_model_orig <- randomForest(POSTED_BY ~ ., data = train)  
  
# Predict class labels on the original test dataset  
test_pred_orig_rf <- predict(rf_model_orig, newdata = test)  
  
# Calculate accuracy for the original test dataset  
accuracy_orig_rf <- mean(test_pred_orig_rf == test$POSTED_BY)  
print(paste("accuracy (original, Random Forest) =", accuracy_orig_rf))
```

```
## [1] "accuracy (original, Random Forest) = 0.773552877270412"
```

```
# Create confusion matrix for the original test dataset  
confusion_matrix_orig_rf <- table(Predicted = test_pred_orig_rf, Actual = test$POSTED_BY)  
confusion_matrix_orig_rf
```

```
##           Actual  
## Predicted Builder Dealer Owner  
##   Builder      62      24      4  
##   Dealer      76     2934     522  
##   Owner        2      706    1561
```

After fitting the Random Forest model on the training data, we predict the class labels for the test dataset and calculate the model's accuracy. The accuracy is a measure of how well the model correctly classifies the 'POSTED\_BY' variable. In this case, the Random Forest classifier's accuracy on the original test dataset is approximately 77.66%.

Comparing the accuracy of the Random Forest classifier to the accuracy of the multinomial logistic regression model (if applicable) can provide insights into which model performs better on the given dataset. Additionally, it's essential to consider other performance metrics, such as precision, recall, and F1 score, to better understand the model's performance and make more informed decisions about model selection.

```
# -----  
# Perform Logistic Regression on the PCA-transformed binary data  
# -----  
  
# Filter PCA-transformed train and test datasets to include only 'Dealer' and 'Owner'  
binary_train_pc <- train_pc[train_pc$POSTED_BY != "Builder", ]  
binary_test_pc <- test_pc[test_pc$POSTED_BY != "Builder", ]  
  
# Convert the 'POSTED_BY' column to a binary factor  
binary_train_pc$POSTED_BY <- as.factor(ifelse(binary_train_pc$POSTED_BY == "Dealer",  
1, 0))  
binary_test_pc$POSTED_BY <- as.factor(ifelse(binary_test_pc$POSTED_BY == "Dealer", 1,  
0))  
  
# Fit a logistic regression model on the filtered binary PCA-transformed train datase  
t  
glm1_pc <- glm(POSTED_BY ~ ., data = binary_train_pc, family = "binomial")
```

```
## Warning: glm.fit: algorithm did not converge
```

```
## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred
```

```
summary(glm1_pc)
```

```
##
## Call:
## glm(formula = POSTED_BY ~ ., family = "binomial", data = binary_train_pc)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -8.49    -8.49     0.00     0.00     8.49
##
## Coefficients:
##              Estimate Std. Error   z value Pr(>|z|)
## (Intercept)  1.202e+15  4.436e+05  2.709e+09  <2e-16 ***
## PC1          6.406e+13  2.982e+05  2.148e+08  <2e-16 ***
## PC2          4.553e+14  3.655e+05  1.246e+09  <2e-16 ***
## PC3          6.841e+13  4.067e+05  1.682e+08  <2e-16 ***
## PC4         -8.273e+13  4.357e+05 -1.899e+08  <2e-16 ***
## PC5         -2.886e+14  5.093e+05 -5.666e+08  <2e-16 ***
## PC6         -2.206e+14  4.978e+05 -4.432e+08  <2e-16 ***
## PC7         -8.947e+14  5.439e+05 -1.645e+09  <2e-16 ***
## PC8          1.134e+15  6.623e+05  1.712e+09  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##      Null deviance:  30320  on 23077  degrees of freedom
## Residual deviance: 655202  on 23069  degrees of freedom
## AIC: 655220
##
## Number of Fisher Scoring iterations: 25
```

```
# Predict probabilities on the filtered binary PCA-transformed test dataset
probs_pc <- predict(glm1_pc, newdata = binary_test_pc, type = "response")

# Set a threshold (0.5) to convert probabilities to class labels (1: Dealer, 0: Owner
)
pred_pc <- ifelse(probs_pc > 0.5, 1, 0)

# Calculate accuracy
acc_pc <- mean(pred_pc == as.numeric(as.character(binary_test_pc$POSTED_BY)))
print(paste("accuracy (PCA) =", acc_pc))
```

```
## [1] "accuracy (PCA) = 0.604764388801947"
```

```
# Create a confusion matrix
table(Predicted = pred_pc, Actual = binary_test_pc$POSTED_BY)
```

```
##           Actual
## Predicted    0    1
##           0  127  313
##           1 1960 3351
```

In this section, we fit a logistic regression model on the PCA-transformed train dataset, which includes only 'Dealer' and 'Owner' instances. Logistic regression is a statistical method used to analyze the relationship between a binary dependent variable ('POSTED\_BY' in this case) and one or more independent variables.

The binary\_train\_pc and binary\_test\_pc datasets were created by filtering out 'Builder' instances from the train\_pc and test\_pc datasets, respectively. Next, the 'POSTED\_BY' variable was converted to a binary factor, with 'Dealer' coded as 1 and 'Owner' coded as 0.

After fitting the logistic regression model on the binary\_train\_pc dataset, we obtain the model coefficients, standard errors, z values, and p-values. Note that the algorithm did not converge, and fitted probabilities numerically 0 or 1 occurred. This may indicate that the model is not an ideal fit for the data, and further investigation or adjustments may be necessary.

All coefficients are highly statistically significant, as indicated by the extremely small p-values ( $p < 2e-16$ ). However, it's essential to consider the algorithm's convergence issue and examine other performance metrics, such as accuracy, precision, recall, and F1 score, to assess the logistic regression model's quality on the PCA-transformed binary data.

```
# -----
# Perform LDA on the original numeric data
# -----

library(MASS)
```

```
##
## Attaching package: 'MASS'
```

```
## The following object is masked from 'package:dplyr':
##
##      select
```

```
# Fit an LDA model on the train dataset with only numeric columns
numeric_train <- train[, numeric_columns_train]
numeric_train$POSTED_BY <- train$POSTED_BY

# Perform LDA on the numeric_train dataset
lda1 <- lda(POSTED_BY ~ ., data = numeric_train)
```

```
## Warning in lda.default(x, grouping, ...): variables are collinear
```

```
lda1$means
```

```
##          UNDER_CONSTRUCTION      RERA  BHK_NO.  SQUARE_FT  READY_TO_MOVE
## Builder      0.66804979 0.6639004 2.226141   3742.723      0.3319502
## Dealer      0.23162644 0.4067820 2.453682  14898.021      0.7683736
## Owner       0.06342445 0.1462549 2.292273  41616.485      0.9365756
##          RESALE LONGITUDE LATITUDE  TARGET.PRICE_IN_LACS.
## Builder 0.002074689   19.98951  76.55979           211.42884
## Dealer  0.921856840   21.67930  76.54631           186.60404
## Owner   0.997633416   20.76092  77.17793            62.45078
```

After fitting the LDA model on the `numeric_train` dataset, we received a warning that the variables are collinear. This means that there is a high degree of correlation between some of the predictors, which may affect the LDA model's stability and performance. It is advised to investigate these correlations and potentially remove or combine some predictors before refitting the LDA model.

Despite the collinearity issue, the LDA model provides group means for each of the numeric predictors, separated by the 'POSTED\_BY' categories (Builder, Dealer, and Owner). These means can be used to understand the differences in the predictor variables' average values between the three groups.

Looking at the `SQUARE_FT` variable, we can see that properties listed by Owners have, on average, the largest square footage (41616.49), followed by Dealers (14898.02) and Builders (3742.72). Similarly, `TARGET.PRICE_IN_LACS` shows that properties listed by Builders have the highest average target price (211.43), followed by Dealers (186.60) and Owners (62.45).

```
# Predict class labels on the test dataset with only numeric columns
numeric_test <- test[, numeric_columns_test]
numeric_test$POSTED_BY <- test$POSTED_BY

lda_pred <- predict(lda1, newdata = numeric_test, type = "class")
lda_pred$class
```

```
##      [1] Dealer Dealer Dealer Dealer Dealer Owner Dealer Dealer Dealer
##     [10] Dealer Dealer Dealer Dealer Dealer Dealer Builder Dealer Dealer
##     [19] Dealer Dealer Owner Owner Dealer Dealer Dealer Dealer Dealer
##     [28] Dealer Dealer Dealer Owner Dealer Dealer Dealer Dealer Dealer
##     [37] Owner Dealer Dealer Dealer Owner Dealer Dealer Dealer Dealer
##     [46] Dealer Dealer Dealer Dealer Owner Dealer Dealer Builder Dealer
##     [55] Builder Dealer Dealer Dealer Dealer Dealer Dealer Dealer Owner
##     [64] Dealer Dealer Owner Dealer Dealer Dealer Dealer Owner Owner
##     [73] Builder Dealer Dealer Dealer Owner Dealer Dealer Dealer Dealer
##     [82] Dealer Owner Builder Owner Dealer Dealer Dealer Dealer Dealer
##     [91] Owner Dealer Dealer Dealer Dealer Dealer Dealer Owner Builder
##    [100] Dealer Dealer Dealer Dealer Owner Dealer Dealer Dealer Dealer
##    [109] Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer
##    [118] Dealer Dealer Dealer Dealer Dealer Dealer Dealer Owner Dealer
##    [127] Builder Dealer Builder Dealer Dealer Owner Dealer Dealer Dealer
##    [136] Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer
```

##	[145]	Owner	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Owner	Dealer
##	[154]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Dealer
##	[163]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer
##	[172]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[181]	Owner	Dealer	Builder	Owner	Dealer	Dealer	Dealer	Dealer	Owner
##	[190]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Builder	Dealer	Dealer
##	[199]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer
##	[208]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[217]	Owner	Dealer	Dealer	Builder	Dealer	Owner	Dealer	Dealer	Builder
##	[226]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[235]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Builder
##	[244]	Dealer	Owner	Dealer	Builder	Dealer	Dealer	Owner	Dealer	Owner
##	[253]	Owner	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Builder
##	[262]	Owner	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Owner
##	[271]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[280]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[289]	Owner	Owner	Dealer	Dealer	Dealer	Owner	Dealer	Owner	Dealer
##	[298]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Owner
##	[307]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Builder	Owner
##	[316]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[325]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[334]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[343]	Owner	Owner	Owner	Dealer	Builder	Dealer	Dealer	Dealer	Dealer
##	[352]	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[361]	Dealer	Dealer	Dealer	Owner	Dealer	Owner	Builder	Dealer	Dealer
##	[370]	Owner	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[379]	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Owner	Builder	Dealer
##	[388]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[397]	Dealer	Dealer	Owner	Dealer	Owner	Owner	Dealer	Owner	Dealer
##	[406]	Dealer	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer
##	[415]	Builder	Dealer	Owner	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[424]	Builder	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Owner	Dealer
##	[433]	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Owner	Dealer	Dealer
##	[442]	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Builder	Owner
##	[451]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder
##	[460]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[469]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Builder	Owner	Dealer
##	[478]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[487]	Owner	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[496]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[505]	Owner	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[514]	Dealer	Owner	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer
##	[523]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[532]	Owner	Dealer	Owner	Dealer	Dealer	Builder	Dealer	Owner	Dealer
##	[541]	Dealer	Builder	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[550]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[559]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[568]	Owner	Dealer	Dealer	Owner	Dealer	Dealer	Builder	Dealer	Dealer
##	[577]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[586]	Dealer	Builder	Owner	Dealer	Owner	Dealer	Dealer	Builder	Dealer

##	[595]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[604]	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[613]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Builder	Dealer
##	[622]	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[631]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[640]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Owner	Dealer
##	[649]	Builder	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Dealer
##	[658]	Dealer	Dealer	Dealer	Owner	Dealer	Owner	Dealer	Dealer	Dealer
##	[667]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Owner	Builder	Dealer
##	[676]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[685]	Dealer	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[694]	Builder	Owner	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[703]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[712]	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[721]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[730]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[739]	Builder	Dealer	Owner	Owner	Dealer	Builder	Dealer	Dealer	Dealer
##	[748]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[757]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[766]	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[775]	Dealer	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[784]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[793]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer
##	[802]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder
##	[811]	Owner	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[820]	Dealer	Owner	Dealer	Dealer	Builder	Dealer	Dealer	Builder	Owner
##	[829]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Dealer
##	[838]	Owner	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Dealer
##	[847]	Dealer	Dealer	Owner	Dealer	Owner	Dealer	Dealer	Builder	Owner
##	[856]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[865]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[874]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Builder
##	[883]	Dealer	Owner	Dealer	Owner	Dealer	Owner	Owner	Dealer	Dealer
##	[892]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[901]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Builder
##	[910]	Dealer	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[919]	Dealer	Builder	Dealer	Dealer	Dealer	Owner	Owner	Dealer	Dealer
##	[928]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[937]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer
##	[946]	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer
##	[955]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer
##	[964]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[973]	Dealer	Dealer	Builder	Builder	Dealer	Dealer	Owner	Owner	Dealer
##	[982]	Dealer	Dealer	Owner	Dealer	Owner	Owner	Dealer	Dealer	Dealer
##	[991]	Builder	Dealer	Dealer	Owner	Owner	Dealer	Builder	Dealer	Dealer
##	[1000]	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer
##	[1009]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[1018]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner
##	[1027]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[1036]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Builder	Dealer	Dealer

##	[1045]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[1054]	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Builder	Dealer
##	[1063]	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Owner	Owner
##	[1072]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1081]	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Owner	Dealer
##	[1090]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[1099]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1108]	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Owner
##	[1117]	Dealer	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer
##	[1126]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder
##	[1135]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Builder
##	[1144]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Dealer
##	[1153]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1162]	Dealer	Owner	Dealer	Dealer	Builder	Builder	Owner	Dealer
##	[1171]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner
##	[1180]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Owner
##	[1189]	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1198]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder
##	[1207]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[1216]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1225]	Owner	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer
##	[1234]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Builder	Dealer
##	[1243]	Dealer	Builder	Dealer	Dealer	Owner	Dealer	Dealer	Owner
##	[1252]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Builder	Dealer
##	[1261]	Owner	Builder	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[1270]	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[1279]	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer
##	[1288]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[1297]	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Owner	Dealer
##	[1306]	Dealer	Dealer	Owner	Dealer	Owner	Dealer	Dealer	Dealer
##	[1315]	Dealer	Dealer	Builder	Dealer	Dealer	Owner	Dealer	Dealer
##	[1324]	Dealer	Dealer	Owner	Dealer	Owner	Dealer	Dealer	Dealer
##	[1333]	Owner	Builder	Dealer	Dealer	Dealer	Owner	Owner	Dealer
##	[1342]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Owner
##	[1351]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[1360]	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer
##	[1369]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[1378]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[1387]	Dealer	Dealer	Builder	Owner	Dealer	Owner	Owner	Owner
##	[1396]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1405]	Dealer	Dealer	Dealer	Dealer	Owner	Builder	Dealer	Owner
##	[1414]	Dealer	Dealer	Dealer	Dealer	Owner	Builder	Dealer	Dealer
##	[1423]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[1432]	Owner	Dealer	Dealer	Dealer	Owner	Owner	Dealer	Builder
##	[1441]	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Owner	Dealer
##	[1450]	Dealer	Builder	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[1459]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1468]	Dealer	Owner	Dealer	Builder	Dealer	Dealer	Owner	Builder
##	[1477]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[1486]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner



##	[1495]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1504]	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Owner	Owner
##	[1513]	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Owner	Owner
##	[1522]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[1531]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[1540]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1549]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[1558]	Builder	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1567]	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Builder	Dealer
##	[1576]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1585]	Dealer	Dealer	Owner	Dealer	Dealer	Builder	Owner	Owner
##	[1594]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[1603]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1612]	Owner	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer
##	[1621]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[1630]	Dealer	Dealer	Builder	Dealer	Owner	Dealer	Dealer	Dealer
##	[1639]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1648]	Owner	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Owner
##	[1657]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1666]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner
##	[1675]	Builder	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1684]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Owner	Owner
##	[1693]	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Builder	Dealer
##	[1702]	Dealer	Builder	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[1711]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1720]	Dealer	Builder	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[1729]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[1738]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[1747]	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Owner
##	[1756]	Dealer	Dealer	Owner	Dealer	Dealer	Builder	Owner	Dealer
##	[1765]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1774]	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Builder
##	[1783]	Dealer	Dealer	Dealer	Builder	Owner	Dealer	Dealer	Owner
##	[1792]	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Owner
##	[1801]	Owner	Dealer	Dealer	Dealer	Owner	Dealer	Owner	Owner
##	[1810]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[1819]	Dealer	Dealer	Dealer	Owner	Dealer	Builder	Dealer	Owner
##	[1828]	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer
##	[1837]	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[1846]	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1855]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Dealer
##	[1864]	Dealer	Owner	Dealer	Builder	Dealer	Dealer	Dealer	Builder
##	[1873]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1882]	Builder	Dealer	Builder	Owner	Dealer	Owner	Builder	Dealer
##	[1891]	Builder	Dealer	Dealer	Owner	Owner	Dealer	Owner	Dealer
##	[1900]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[1909]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[1918]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[1927]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Owner
##	[1936]	Dealer	Owner	Owner	Builder	Dealer	Dealer	Dealer	Dealer

##	[1945]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Owner
##	[1954]	Owner	Builder	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[1963]	Owner	Dealer	Dealer	Builder	Owner	Dealer	Owner	Dealer
##	[1972]	Owner	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Dealer
##	[1981]	Owner	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Owner
##	[1990]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[1999]	Dealer	Dealer	Owner	Dealer	Builder	Builder	Dealer	Dealer
##	[2008]	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[2017]	Dealer	Owner	Owner	Dealer	Dealer	Owner	Dealer	Dealer
##	[2026]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Owner
##	[2035]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Owner
##	[2044]	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Builder
##	[2053]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[2062]	Builder	Dealer	Dealer	Owner	Dealer	Owner	Dealer	Owner
##	[2071]	Dealer	Dealer	Dealer	Dealer	Owner	Owner	Builder	Dealer
##	[2080]	Builder	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[2089]	Dealer	Builder	Owner	Dealer	Dealer	Owner	Builder	Dealer
##	[2098]	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2107]	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[2116]	Builder	Dealer	Dealer	Owner	Owner	Dealer	Builder	Dealer
##	[2125]	Builder	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Builder
##	[2134]	Owner	Owner	Dealer	Dealer	Builder	Dealer	Dealer	Builder
##	[2143]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[2152]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2161]	Owner	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[2170]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[2179]	Owner	Owner	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[2188]	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer
##	[2197]	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Owner
##	[2206]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[2215]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2224]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2233]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[2242]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Owner	Dealer
##	[2251]	Owner	Builder	Dealer	Owner	Dealer	Dealer	Dealer	Owner
##	[2260]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Owner
##	[2269]	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Dealer	Builder
##	[2278]	Builder	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2287]	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2296]	Dealer	Dealer	Dealer	Owner	Owner	Owner	Dealer	Dealer
##	[2305]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2314]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[2323]	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[2332]	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2341]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[2350]	Dealer	Builder	Owner	Dealer	Dealer	Dealer	Owner	Dealer
##	[2359]	Owner	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer
##	[2368]	Dealer	Builder	Owner	Owner	Owner	Dealer	Dealer	Dealer
##	[2377]	Dealer	Dealer	Dealer	Owner	Dealer	Builder	Dealer	Owner
##	[2386]	Builder	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer

##	[2395]	Dealer	Owner	Builder	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[2404]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Owner	Dealer	Builder
##	[2413]	Dealer	Dealer	Builder	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[2422]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2431]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Builder
##	[2440]	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Builder
##	[2449]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[2458]	Dealer	Builder	Builder	Owner	Dealer	Dealer	Builder	Dealer	Dealer
##	[2467]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Builder	Dealer	Dealer
##	[2476]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Dealer
##	[2485]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2494]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[2503]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2512]	Owner	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[2521]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[2530]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[2539]	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Owner	Dealer
##	[2548]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2557]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[2566]	Dealer	Builder	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Dealer
##	[2575]	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[2584]	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer
##	[2593]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[2602]	Owner	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[2611]	Owner	Owner	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[2620]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Owner
##	[2629]	Owner	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer
##	[2638]	Dealer	Builder	Owner	Dealer	Owner	Dealer	Dealer	Owner	Dealer
##	[2647]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner
##	[2656]	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer
##	[2665]	Dealer	Owner	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Owner
##	[2674]	Dealer	Dealer	Dealer	Owner	Dealer	Owner	Dealer	Builder	Dealer
##	[2683]	Dealer	Dealer	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[2692]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Dealer
##	[2701]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Builder
##	[2710]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2719]	Owner	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer
##	[2728]	Dealer	Dealer	Dealer	Builder	Builder	Dealer	Dealer	Dealer	Dealer
##	[2737]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer
##	[2746]	Owner	Dealer	Builder	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[2755]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2764]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Dealer
##	[2773]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2782]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2791]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Dealer
##	[2800]	Dealer	Owner	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2809]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[2818]	Dealer	Dealer	Owner	Builder	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2827]	Owner	Dealer	Dealer	Dealer	Builder	Owner	Dealer	Dealer	Dealer
##	[2836]	Dealer	Dealer	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Owner

##	[2845]	Dealer	Owner	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[2854]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Owner	Dealer	Dealer
##	[2863]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2872]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[2881]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Builder	Builder
##	[2890]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner
##	[2899]	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Owner	Dealer
##	[2908]	Builder	Dealer	Builder	Builder	Builder	Owner	Owner	Owner	Dealer
##	[2917]	Dealer	Owner	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2926]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2935]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2944]	Owner	Owner	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[2953]	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Owner
##	[2962]	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2971]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[2980]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2989]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[2998]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Owner	Dealer	Dealer
##	[3007]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[3016]	Dealer	Builder	Dealer	Owner	Dealer	Dealer	Builder	Owner	Dealer
##	[3025]	Owner	Owner	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer
##	[3034]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Owner
##	[3043]	Dealer	Dealer	Builder	Owner	Dealer	Dealer	Owner	Dealer	Dealer
##	[3052]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3061]	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[3070]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3079]	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3088]	Dealer	Owner	Dealer	Dealer	Dealer	Builder	Owner	Owner	Dealer
##	[3097]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3106]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[3115]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3124]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Owner
##	[3133]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer
##	[3142]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[3151]	Owner	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Builder
##	[3160]	Dealer	Dealer	Builder	Dealer	Owner	Dealer	Dealer	Owner	Dealer
##	[3169]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3178]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Owner	Owner
##	[3187]	Dealer	Builder	Builder	Dealer	Dealer	Dealer	Builder	Dealer	Dealer
##	[3196]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3205]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Builder	Owner	Dealer
##	[3214]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[3223]	Dealer	Dealer	Owner	Dealer	Owner	Owner	Dealer	Dealer	Dealer
##	[3232]	Dealer	Owner	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Owner
##	[3241]	Dealer	Dealer	Owner	Dealer	Owner	Builder	Dealer	Owner	Dealer
##	[3250]	Owner	Dealer	Dealer	Owner	Builder	Dealer	Dealer	Dealer	Dealer
##	[3259]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[3268]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3277]	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[3286]	Owner	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Dealer

[illegible]

[illegible]

##	[4195]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4204]	Owner	Owner	Dealer	Dealer	Owner	Builder	Builder	Owner	Dealer
##	[4213]	Owner	Dealer	Dealer	Dealer	Dealer	Builder	Owner	Dealer	Dealer
##	[4222]	Dealer	Dealer	Dealer	Owner	Builder	Builder	Dealer	Dealer	Dealer
##	[4231]	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[4240]	Dealer	Dealer	Builder	Owner	Owner	Dealer	Builder	Dealer	Dealer
##	[4249]	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Owner	Dealer	Owner
##	[4258]	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[4267]	Dealer	Dealer	Owner	Dealer	Builder	Dealer	Dealer	Dealer	Dealer
##	[4276]	Dealer	Dealer	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer
##	[4285]	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4294]	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Owner
##	[4303]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Builder	Dealer	Owner
##	[4312]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4321]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[4330]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4339]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[4348]	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Owner	Dealer	Dealer
##	[4357]	Dealer	Dealer	Dealer	Owner	Dealer	Builder	Dealer	Dealer	Dealer
##	[4366]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4375]	Dealer	Owner	Builder	Dealer	Owner	Dealer	Dealer	Builder	Dealer
##	[4384]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[4393]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[4402]	Dealer	Dealer	Owner	Dealer	Dealer	Builder	Owner	Dealer	Dealer
##	[4411]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[4420]	Dealer	Dealer	Owner	Dealer	Dealer	Builder	Dealer	Owner	Dealer
##	[4429]	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4438]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Dealer
##	[4447]	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Owner	Dealer	Dealer
##	[4456]	Dealer	Dealer	Builder	Dealer	Owner	Builder	Owner	Dealer	Dealer
##	[4465]	Builder	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[4474]	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Owner	Dealer	Dealer
##	[4483]	Dealer	Dealer	Builder	Dealer	Owner	Owner	Dealer	Dealer	Dealer
##	[4492]	Dealer	Dealer	Owner	Builder	Dealer	Dealer	Owner	Dealer	Dealer
##	[4501]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[4510]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[4519]	Dealer	Owner	Dealer	Owner	Dealer	Owner	Dealer	Dealer	Owner
##	[4528]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Owner	Builder	Dealer
##	[4537]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4546]	Dealer	Dealer	Owner	Builder	Builder	Dealer	Dealer	Owner	Dealer
##	[4555]	Builder	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[4564]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[4573]	Dealer	Dealer	Dealer	Owner	Builder	Dealer	Builder	Dealer	Dealer
##	[4582]	Dealer	Dealer	Dealer	Owner	Dealer	Builder	Dealer	Dealer	Dealer
##	[4591]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Owner
##	[4600]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Owner
##	[4609]	Owner	Dealer	Owner	Builder	Dealer	Dealer	Builder	Dealer	Owner
##	[4618]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder
##	[4627]	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[4636]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Dealer	Dealer

##	[4645]	Owner	Dealer	Owner	Dealer	Dealer	Owner	Owner	Dealer	Dealer
##	[4654]	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4663]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[4672]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Builder	Owner	Dealer
##	[4681]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4690]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[4699]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4708]	Owner	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner
##	[4717]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Owner
##	[4726]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[4735]	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[4744]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[4753]	Dealer	Dealer	Dealer	Dealer	Builder	Owner	Owner	Owner	Builder
##	[4762]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[4771]	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[4780]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[4789]	Builder	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Owner	Dealer
##	[4798]	Dealer	Owner	Dealer	Owner	Dealer	Owner	Dealer	Owner	Dealer
##	[4807]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4816]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Dealer
##	[4825]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4834]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Builder
##	[4843]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Builder
##	[4852]	Dealer	Dealer	Builder	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[4861]	Dealer	Owner	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer
##	[4870]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer
##	[4879]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4888]	Dealer	Dealer	Builder	Dealer	Dealer	Builder	Dealer	Dealer	Owner
##	[4897]	Dealer	Owner	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Dealer
##	[4906]	Owner	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer
##	[4915]	Owner	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Owner	Dealer
##	[4924]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[4933]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4942]	Owner	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Builder	Dealer
##	[4951]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4960]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[4969]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4978]	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Owner	Dealer	Dealer
##	[4987]	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Owner	Dealer
##	[4996]	Builder	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[5005]	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5014]	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer
##	[5023]	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[5032]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Dealer
##	[5041]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner
##	[5050]	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Owner	Dealer	Owner
##	[5059]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer
##	[5068]	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Owner	Owner	Dealer
##	[5077]	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5086]	Dealer	Dealer	Owner	Dealer	Builder	Dealer	Dealer	Owner	Builder



##	[5095]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[5104]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Owner	Dealer
##	[5113]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[5122]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Owner	Dealer	Dealer
##	[5131]	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Owner	Dealer
##	[5140]	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[5149]	Owner	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Builder
##	[5158]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[5167]	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Owner	Dealer
##	[5176]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Owner
##	[5185]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5194]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[5203]	Dealer	Dealer	Dealer	Dealer	Builder	Owner	Dealer	Dealer	Owner
##	[5212]	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5221]	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Owner
##	[5230]	Dealer	Dealer	Dealer	Owner	Owner	Builder	Dealer	Dealer	Dealer
##	[5239]	Dealer	Builder	Dealer	Owner	Builder	Dealer	Dealer	Builder	Dealer
##	[5248]	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner
##	[5257]	Dealer	Dealer	Dealer	Owner	Dealer	Owner	Owner	Dealer	Dealer
##	[5266]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Builder
##	[5275]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5284]	Dealer	Owner	Owner	Dealer	Owner	Dealer	Owner	Dealer	Dealer
##	[5293]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Builder	Dealer
##	[5302]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer
##	[5311]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5320]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[5329]	Dealer	Dealer	Builder	Dealer	Dealer	Builder	Dealer	Owner	Dealer
##	[5338]	Dealer	Dealer	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer
##	[5347]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[5356]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5365]	Owner	Builder	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5374]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5383]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[5392]	Owner	Owner	Builder	Owner	Dealer	Owner	Dealer	Owner	Builder
##	[5401]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[5410]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Owner
##	[5419]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer
##	[5428]	Owner	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer
##	[5437]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5446]	Owner	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[5455]	Owner	Dealer	Owner	Dealer	Dealer	Owner	Builder	Dealer	Dealer
##	[5464]	Dealer	Builder	Owner	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[5473]	Dealer	Builder	Dealer	Builder	Dealer	Builder	Dealer	Dealer	Dealer
##	[5482]	Dealer	Dealer	Owner	Dealer	Builder	Owner	Dealer	Dealer	Dealer
##	[5491]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Owner
##	[5500]	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5509]	Dealer	Dealer	Builder	Dealer	Owner	Builder	Owner	Owner	Dealer
##	[5518]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[5527]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5536]	Dealer	Dealer	Owner	Dealer	Owner	Owner	Dealer	Dealer	Owner

```
## [5545] Dealer Dealer Dealer Owner Dealer Dealer Dealer Dealer Dealer Dealer
## [5554] Dealer Dealer Owner Owner Dealer Dealer Dealer Dealer Dealer Dealer
## [5563] Dealer Dealer Builder Dealer Builder Owner Dealer Dealer Dealer Dealer
## [5572] Dealer Owner Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer
## [5581] Dealer Builder Builder Dealer Dealer Owner Dealer Owner Dealer Dealer
## [5590] Dealer Dealer Dealer Dealer Owner Dealer Dealer Owner Dealer Dealer
## [5599] Builder Dealer Dealer Owner Dealer Dealer Dealer Dealer Dealer Dealer
## [5608] Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer Builder Dealer
## [5617] Dealer Owner Dealer Dealer Dealer Dealer Dealer Dealer Dealer Owner
## [5626] Dealer Dealer Dealer Dealer Owner Dealer Owner Dealer Dealer Dealer
## [5635] Dealer Owner Dealer Owner Dealer Dealer Dealer Dealer Dealer Dealer
## [5644] Builder Dealer Dealer Owner Dealer Dealer Builder Dealer Dealer Dealer
## [5653] Dealer Dealer Builder Dealer Dealer Dealer Dealer Dealer Dealer Dealer
## [5662] Dealer Owner Owner Dealer Dealer Dealer Dealer Dealer Dealer Dealer
## [5671] Dealer Dealer Dealer Dealer Owner Builder Dealer Dealer Dealer Dealer
## [5680] Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer
## [5689] Dealer Owner Dealer Dealer Owner Owner Dealer Dealer Dealer Dealer
## [5698] Dealer Dealer Dealer Dealer Owner Dealer Dealer Builder Dealer Dealer
## [5707] Dealer Dealer Dealer Dealer Owner Dealer Owner Dealer Dealer Dealer
## [5716] Dealer Dealer Owner Dealer Owner Dealer Dealer Dealer Dealer Dealer
## [5725] Dealer Dealer Dealer Dealer Owner Dealer Dealer Dealer Dealer Dealer
## [5734] Dealer Builder Dealer Dealer Dealer Dealer Dealer Owner Dealer Dealer
## [5743] Dealer Dealer Dealer Dealer Dealer Dealer Dealer Builder Dealer Dealer
## [5752] Owner Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer
## [5761] Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer Owner Builder
## [5770] Owner Owner Dealer Owner Dealer Dealer Owner Dealer Owner Dealer
## [5779] Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer Builder
## [5788] Dealer Dealer Dealer Dealer Dealer Dealer Builder Owner Dealer Dealer
## [5797] Dealer Dealer Builder Dealer Dealer Dealer Dealer Dealer Owner Dealer
## [5806] Dealer Dealer Dealer Dealer Owner Dealer Dealer Dealer Dealer Dealer
## [5815] Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer Owner Dealer
## [5824] Dealer Dealer Builder Dealer Dealer Dealer Dealer Owner Dealer Dealer
## [5833] Dealer Dealer Dealer Owner Dealer Dealer Dealer Owner Dealer Dealer
## [5842] Dealer Owner Dealer Dealer Dealer Dealer Dealer Owner Owner Dealer
## [5851] Dealer Owner Dealer Owner Dealer Dealer Dealer Dealer Builder Builder
## [5860] Dealer Owner Dealer Dealer Owner Dealer Dealer Dealer Dealer Dealer
## [5869] Dealer Dealer Dealer Owner Owner Dealer Dealer Dealer Dealer Dealer
## [5878] Dealer Builder Dealer Dealer Owner Dealer Dealer Dealer Dealer Dealer
## [5887] Dealer Builder Owner Builder Dealer
## Levels: Builder Dealer Owner
```

```
# Calculate accuracy
mean(lda_pred$class == numeric_test$POSTED_BY)
```

```
## [1] 0.643524
```

```
# Examine the structure of the lda_pred object
str(lda_pred)
```

```
## List of 3
## $ class      : Factor w/ 3 levels "Builder","Dealer",...: 2 2 2 2 2 3 2 2 2 2 ...
## $ posterior: num [1:5891, 1:3] 1.46e-07 4.34e-07 1.40e-07 2.25e-07 2.66e-07 ...
## ..- attr(*, "dimnames")=List of 2
## .. ..$ : chr [1:5891] "4" "5" "8" "9" ...
## .. ..$ : chr [1:3] "Builder" "Dealer" "Owner"
## $ x      : num [1:5891, 1:2] 0.305 0.162 0.255 0.27 0.358 ...
## ..- attr(*, "dimnames")=List of 2
## .. ..$ : chr [1:5891] "4" "5" "8" "9" ...
## .. ..$ : chr [1:2] "LD1" "LD2"
```

```
# Prepare the numeric_test dataset for LDA predictions
```

```
numeric_test <- test[, numeric_columns_test]
```

```
numeric_test$POSTED_BY <- test$POSTED_BY
```

```
# Predict class labels on the numeric_test dataset using the LDA model
```

```
lda_pred <- predict(lda1, newdata = numeric_test, type = "class")
```

```
lda_pred$class
```

```
##      [1] Dealer Dealer Dealer Dealer Dealer Owner Dealer Dealer Dealer
##     [10] Dealer Dealer Dealer Dealer Dealer Dealer Builder Dealer Dealer
##     [19] Dealer Dealer Owner Owner Dealer Dealer Dealer Dealer Dealer
##     [28] Dealer Dealer Dealer Owner Dealer Dealer Dealer Dealer Dealer
##     [37] Owner Dealer Dealer Dealer Owner Dealer Dealer Dealer Owner
##     [46] Dealer Dealer Dealer Dealer Owner Dealer Dealer Builder Dealer
##     [55] Builder Dealer Dealer Dealer Dealer Dealer Dealer Owner Owner
##     [64] Dealer Dealer Owner Dealer Dealer Dealer Owner Owner Owner Dealer
##     [73] Builder Dealer Dealer Dealer Owner Dealer Dealer Owner Dealer
##     [82] Dealer Owner Builder Owner Dealer Dealer Dealer Dealer Dealer
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##    [172] Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer
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##    [217] Owner Dealer Dealer Builder Dealer Owner Dealer Dealer Builder
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##    [235] Dealer Dealer Dealer Owner Dealer Dealer Dealer Dealer Builder
##    [244] Dealer Owner Dealer Builder Dealer Dealer Owner Dealer Owner
##    [253] Owner Owner Dealer Owner Dealer Dealer Dealer Dealer Builder
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[illegible]

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##	[2746]	Owner	Dealer	Builder	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[2755]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2764]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Dealer
##	[2773]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2782]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2791]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Dealer
##	[2800]	Dealer	Owner	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2809]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[2818]	Dealer	Dealer	Owner	Builder	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2827]	Owner	Dealer	Dealer	Dealer	Builder	Owner	Dealer	Dealer	Dealer
##	[2836]	Dealer	Dealer	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Owner
##	[2845]	Dealer	Owner	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[2854]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Owner	Dealer	Dealer
##	[2863]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2872]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[2881]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Builder	Builder
##	[2890]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner
##	[2899]	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Owner	Dealer
##	[2908]	Builder	Dealer	Builder	Builder	Builder	Owner	Owner	Owner	Dealer
##	[2917]	Dealer	Owner	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2926]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2935]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[2944]	Owner	Owner	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[2953]	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Owner

[illegible]

##	[3412]	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[3421]	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3430]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3439]	Builder	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Owner	Owner
##	[3448]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner
##	[3457]	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[3466]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Owner	Dealer
##	[3475]	Dealer	Dealer	Builder	Dealer	Builder	Dealer	Dealer	Dealer	Dealer
##	[3484]	Dealer	Owner	Builder	Dealer	Dealer	Dealer	Owner	Owner	Dealer
##	[3493]	Dealer	Builder	Dealer	Owner	Dealer	Owner	Owner	Dealer	Dealer
##	[3502]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3511]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[3520]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Owner
##	[3529]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Dealer
##	[3538]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[3547]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner
##	[3556]	Dealer	Dealer	Owner	Owner	Dealer	Owner	Owner	Dealer	Dealer
##	[3565]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3574]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[3583]	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Owner	Dealer	Dealer
##	[3592]	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3601]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3610]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[3619]	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Owner	Dealer
##	[3628]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[3637]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3646]	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Builder	Dealer	Dealer
##	[3655]	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[3664]	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3673]	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer
##	[3682]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3691]	Dealer	Owner	Builder	Builder	Owner	Dealer	Dealer	Dealer	Builder
##	[3700]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3709]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[3718]	Builder	Owner	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[3727]	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[3736]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3745]	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[3754]	Dealer	Owner	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer
##	[3763]	Dealer	Dealer	Owner	Owner	Builder	Dealer	Dealer	Dealer	Dealer
##	[3772]	Builder	Owner	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Builder
##	[3781]	Dealer	Builder	Dealer	Builder	Dealer	Dealer	Builder	Dealer	Dealer
##	[3790]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3799]	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Builder
##	[3808]	Dealer	Dealer	Owner	Builder	Dealer	Dealer	Builder	Dealer	Dealer
##	[3817]	Dealer	Dealer	Owner	Dealer	Builder	Dealer	Dealer	Dealer	Builder
##	[3826]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder
##	[3835]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3844]	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Owner	Builder
##	[3853]	Dealer	Dealer	Dealer	Dealer	Owner	Builder	Dealer	Builder	Dealer

##	[3862]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[3871]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[3880]	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Owner
##	[3889]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[3898]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[3907]	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Owner
##	[3916]	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Owner	Dealer	Owner
##	[3925]	Dealer	Dealer	Dealer	Builder	Dealer	Owner	Dealer	Dealer	Dealer
##	[3934]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[3943]	Dealer	Dealer	Owner	Dealer	Builder	Owner	Dealer	Dealer	Owner
##	[3952]	Dealer	Owner	Dealer	Dealer	Owner	Builder	Dealer	Dealer	Owner
##	[3961]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[3970]	Owner	Owner	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[3979]	Builder	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[3988]	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Owner	Dealer	Dealer
##	[3997]	Dealer	Owner	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4006]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[4015]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[4024]	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[4033]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4042]	Dealer	Owner	Dealer	Builder	Dealer	Dealer	Dealer	Builder	Owner
##	[4051]	Builder	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Owner
##	[4060]	Dealer	Dealer	Dealer	Owner	Owner	Owner	Dealer	Dealer	Dealer
##	[4069]	Dealer	Builder	Dealer	Owner	Owner	Dealer	Owner	Owner	Dealer
##	[4078]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4087]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Owner
##	[4096]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner
##	[4105]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[4114]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Owner
##	[4123]	Dealer	Dealer	Builder	Builder	Dealer	Dealer	Builder	Dealer	Dealer
##	[4132]	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4141]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner
##	[4150]	Owner	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4159]	Dealer	Dealer	Dealer	Builder	Owner	Dealer	Dealer	Dealer	Dealer
##	[4168]	Owner	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[4177]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Owner	Dealer
##	[4186]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[4195]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4204]	Owner	Owner	Dealer	Dealer	Owner	Builder	Builder	Owner	Dealer
##	[4213]	Owner	Dealer	Dealer	Dealer	Dealer	Builder	Owner	Dealer	Dealer
##	[4222]	Dealer	Dealer	Dealer	Owner	Builder	Builder	Dealer	Dealer	Dealer
##	[4231]	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[4240]	Dealer	Dealer	Builder	Owner	Owner	Dealer	Builder	Dealer	Dealer
##	[4249]	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Owner	Dealer	Owner
##	[4258]	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[4267]	Dealer	Dealer	Owner	Dealer	Builder	Dealer	Dealer	Dealer	Dealer
##	[4276]	Dealer	Dealer	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer
##	[4285]	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4294]	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Owner
##	[4303]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Builder	Dealer	Owner

##	[4312]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4321]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[4330]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4339]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[4348]	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Owner	Dealer
##	[4357]	Dealer	Dealer	Dealer	Owner	Dealer	Builder	Dealer	Dealer
##	[4366]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4375]	Dealer	Owner	Builder	Dealer	Owner	Dealer	Dealer	Builder
##	[4384]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[4393]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Owner	Dealer
##	[4402]	Dealer	Dealer	Owner	Dealer	Dealer	Builder	Owner	Dealer
##	[4411]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[4420]	Dealer	Dealer	Owner	Dealer	Dealer	Builder	Dealer	Owner
##	[4429]	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4438]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner
##	[4447]	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Owner	Dealer
##	[4456]	Dealer	Dealer	Builder	Dealer	Owner	Builder	Owner	Dealer
##	[4465]	Builder	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer
##	[4474]	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Owner	Dealer
##	[4483]	Dealer	Dealer	Builder	Dealer	Owner	Owner	Dealer	Dealer
##	[4492]	Dealer	Dealer	Owner	Builder	Dealer	Dealer	Owner	Dealer
##	[4501]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Owner
##	[4510]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[4519]	Dealer	Owner	Dealer	Owner	Dealer	Owner	Dealer	Dealer
##	[4528]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Owner	Builder
##	[4537]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4546]	Dealer	Dealer	Owner	Builder	Builder	Dealer	Dealer	Owner
##	[4555]	Builder	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Dealer
##	[4564]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4573]	Dealer	Dealer	Dealer	Owner	Builder	Dealer	Builder	Dealer
##	[4582]	Dealer	Dealer	Dealer	Owner	Dealer	Builder	Dealer	Dealer
##	[4591]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[4600]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[4609]	Owner	Dealer	Owner	Builder	Dealer	Dealer	Builder	Dealer
##	[4618]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4627]	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[4636]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Dealer
##	[4645]	Owner	Dealer	Owner	Dealer	Dealer	Owner	Owner	Dealer
##	[4654]	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer
##	[4663]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[4672]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Builder	Owner
##	[4681]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4690]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[4699]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[4708]	Owner	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[4717]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[4726]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[4735]	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner
##	[4744]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[4753]	Dealer	Dealer	Dealer	Dealer	Builder	Owner	Owner	Owner

##	[4762]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[4771]	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[4780]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[4789]	Builder	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Owner	Dealer
##	[4798]	Dealer	Owner	Dealer	Owner	Dealer	Owner	Dealer	Owner	Dealer
##	[4807]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4816]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Dealer
##	[4825]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4834]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Builder
##	[4843]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Builder
##	[4852]	Dealer	Dealer	Builder	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[4861]	Dealer	Owner	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer
##	[4870]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer
##	[4879]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4888]	Dealer	Dealer	Builder	Dealer	Dealer	Builder	Dealer	Dealer	Owner
##	[4897]	Dealer	Owner	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Dealer
##	[4906]	Owner	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer
##	[4915]	Owner	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Owner	Dealer
##	[4924]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[4933]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4942]	Owner	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Builder	Dealer
##	[4951]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4960]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[4969]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[4978]	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Owner	Dealer	Dealer
##	[4987]	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Owner	Dealer
##	[4996]	Builder	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[5005]	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5014]	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer
##	[5023]	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[5032]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Dealer
##	[5041]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner
##	[5050]	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Owner	Dealer	Owner
##	[5059]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer
##	[5068]	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Owner	Owner	Dealer
##	[5077]	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5086]	Dealer	Dealer	Owner	Dealer	Builder	Dealer	Dealer	Owner	Builder
##	[5095]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[5104]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Owner	Dealer
##	[5113]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[5122]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Owner	Dealer	Dealer
##	[5131]	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Owner	Dealer
##	[5140]	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[5149]	Owner	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Builder
##	[5158]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer
##	[5167]	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Owner	Dealer
##	[5176]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Owner
##	[5185]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5194]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[5203]	Dealer	Dealer	Dealer	Dealer	Builder	Owner	Dealer	Dealer	Owner

##	[5212]	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5221]	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Owner
##	[5230]	Dealer	Dealer	Dealer	Owner	Owner	Builder	Dealer	Dealer	Dealer
##	[5239]	Dealer	Builder	Dealer	Owner	Builder	Dealer	Dealer	Builder	Dealer
##	[5248]	Dealer	Owner	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Owner
##	[5257]	Dealer	Dealer	Dealer	Owner	Dealer	Owner	Owner	Dealer	Dealer
##	[5266]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Builder
##	[5275]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5284]	Dealer	Owner	Owner	Dealer	Owner	Dealer	Owner	Dealer	Dealer
##	[5293]	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Builder	Dealer
##	[5302]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer
##	[5311]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5320]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer
##	[5329]	Dealer	Dealer	Builder	Dealer	Dealer	Builder	Dealer	Owner	Dealer
##	[5338]	Dealer	Dealer	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer
##	[5347]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[5356]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5365]	Owner	Builder	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5374]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5383]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer
##	[5392]	Owner	Owner	Builder	Owner	Dealer	Owner	Dealer	Owner	Builder
##	[5401]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[5410]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Owner
##	[5419]	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer
##	[5428]	Owner	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer
##	[5437]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5446]	Owner	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[5455]	Owner	Dealer	Owner	Dealer	Dealer	Owner	Builder	Dealer	Dealer
##	[5464]	Dealer	Builder	Owner	Dealer	Dealer	Builder	Dealer	Dealer	Dealer
##	[5473]	Dealer	Builder	Dealer	Builder	Dealer	Builder	Dealer	Dealer	Dealer
##	[5482]	Dealer	Dealer	Owner	Dealer	Builder	Owner	Dealer	Dealer	Dealer
##	[5491]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer	Owner
##	[5500]	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5509]	Dealer	Dealer	Builder	Dealer	Owner	Builder	Owner	Owner	Dealer
##	[5518]	Dealer	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer
##	[5527]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5536]	Dealer	Dealer	Owner	Dealer	Owner	Owner	Dealer	Dealer	Owner
##	[5545]	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5554]	Dealer	Dealer	Owner	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5563]	Dealer	Dealer	Builder	Dealer	Builder	Owner	Dealer	Dealer	Dealer
##	[5572]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5581]	Dealer	Builder	Builder	Dealer	Dealer	Owner	Dealer	Owner	Dealer
##	[5590]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Dealer	Owner	Dealer
##	[5599]	Builder	Dealer	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5608]	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Builder	Dealer
##	[5617]	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer	Owner
##	[5626]	Dealer	Dealer	Dealer	Dealer	Owner	Dealer	Owner	Dealer	Dealer
##	[5635]	Dealer	Owner	Dealer	Owner	Dealer	Dealer	Dealer	Dealer	Dealer
##	[5644]	Builder	Dealer	Dealer	Owner	Dealer	Dealer	Builder	Dealer	Dealer
##	[5653]	Dealer	Dealer	Builder	Dealer	Dealer	Dealer	Dealer	Dealer	Dealer

```
## [5662] Dealer Owner Owner Dealer Dealer Dealer Dealer Dealer Dealer
## [5671] Dealer Dealer Dealer Dealer Owner Builder Dealer Dealer Dealer
## [5680] Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer
## [5689] Dealer Owner Dealer Dealer Owner Owner Dealer Dealer Dealer
## [5698] Dealer Dealer Dealer Dealer Owner Dealer Dealer Builder Dealer
## [5707] Dealer Dealer Dealer Dealer Owner Dealer Owner Dealer Dealer
## [5716] Dealer Dealer Owner Dealer Owner Dealer Dealer Dealer Dealer
## [5725] Dealer Dealer Dealer Dealer Owner Dealer Dealer Dealer Dealer
## [5734] Dealer Builder Dealer Dealer Dealer Dealer Owner Dealer Dealer
## [5743] Dealer Dealer Dealer Dealer Dealer Dealer Builder Dealer Dealer
## [5752] Owner Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer
## [5761] Dealer Dealer Dealer Dealer Dealer Dealer Dealer Owner Builder
## [5770] Owner Owner Dealer Owner Dealer Dealer Owner Dealer Owner
## [5779] Dealer Dealer Dealer Dealer Dealer Dealer Dealer Dealer Builder
## [5788] Dealer Dealer Dealer Dealer Dealer Builder Owner Dealer Dealer
## [5797] Dealer Dealer Builder Dealer Dealer Dealer Dealer Owner Dealer
## [5806] Dealer Dealer Dealer Dealer Owner Dealer Dealer Dealer Dealer
## [5815] Dealer Dealer Dealer Dealer Dealer Dealer Dealer Owner Dealer
## [5824] Dealer Dealer Builder Dealer Dealer Dealer Owner Dealer Dealer
## [5833] Dealer Dealer Dealer Owner Dealer Dealer Dealer Owner Dealer
## [5842] Dealer Owner Dealer Dealer Dealer Dealer Owner Owner Dealer
## [5851] Dealer Owner Dealer Owner Dealer Dealer Dealer Builder Builder
## [5860] Dealer Owner Dealer Dealer Owner Dealer Dealer Dealer Dealer
## [5869] Dealer Dealer Dealer Owner Owner Dealer Dealer Dealer Dealer
## [5878] Dealer Builder Dealer Dealer Owner Dealer Dealer Dealer Dealer
## [5887] Dealer Builder Owner Builder Dealer
## Levels: Builder Dealer Owner
```

```
# Calculate the accuracy of the LDA predictions
mean(lda_pred$class == test$POSTED_BY)
```

```
## [1] 0.643524
```

```
# Display the structure of the lda_pred object
str(lda_pred)
```

```
## List of 3
## $ class      : Factor w/ 3 levels "Builder","Dealer",...: 2 2 2 2 2 3 2 2 2 2 ...
## $ posterior: num [1:5891, 1:3] 1.46e-07 4.34e-07 1.40e-07 2.25e-07 2.66e-07 ...
## ..- attr(*, "dimnames")=List of 2
## .. ..$ : chr [1:5891] "4" "5" "8" "9" ...
## .. ..$ : chr [1:3] "Builder" "Dealer" "Owner"
## $ x        : num [1:5891, 1:2] 0.305 0.162 0.255 0.27 0.358 ...
## ..- attr(*, "dimnames")=List of 2
## .. ..$ : chr [1:5891] "4" "5" "8" "9" ...
## .. ..$ : chr [1:2] "LD1" "LD2"
```



We then calculate the accuracy of the LDA model by comparing the predicted class labels with the actual class labels (numeric\_test\$POSTED\_BY). The mean function calculates the proportion of correct predictions, which results in an accuracy of 0.643524 or 64.35%.

The structure of the lda\_pred object is also examined. It contains three elements: 1. class: The predicted class labels (Factor with 3 levels: “Builder”, “Dealer”, “Owner”). 2. posterior: The posterior probabilities for each class, given the input data. 3. x: The transformed data in the lower-dimensional LDA space (2 dimensions in this case, LD1 and LD2).

Overall, the LDA model was able to achieve a moderate accuracy of 64.35% on the test dataset. However, it is important to note that the model was previously fitted with collinear variables, which may affect its stability and performance. Maybe addressing the collinearity issue by removing or combining some predictors could potentially improve the model’s performance.

```
# -----  
# Plot LDA results  
# -----  
  
# Plot the LDA predictions using the first two linear discriminants  
plot(lda_pred$x[, 1], lda_pred$x[, 2], pch = c(23, 21, 22)[unclass(lda_pred$class)],  
bg = c("red", "green", "blue"))
```

