Linear Model

Suman

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##model1

Pr\_P\_Tr<- read.csv("G:/Suman/batch34/project2/Datasheet/Property\_Price\_Train.csv", stringsAsFactors=TRUE)  
model1\_lm<-lm(Sale\_Price~Heating\_Quality+Air\_Conditioning+Electrical\_System+First\_Floor\_Area+Second\_Floor\_Area+Grade\_Living\_Area+Underground\_Half\_Bathroom+Full\_Bathroom\_Above\_Grade+Kitchen\_Above\_Grade+Kitchen\_Quality+Rooms\_Above\_Grade+Functional\_Rate+Fireplaces+Fireplace\_Quality+Pool\_Area+Garage  
 +Garage\_Finish\_Year+Garage\_Quality+Garage\_Built\_Year+Garage\_Condition+Pavedd\_Drive  
 +BsmtFinSF1+BsmtUnfSF+Total\_Basement\_Area+Building\_Class+Zoning\_Class+Lot\_Extent+Lot\_Size+Property\_Shape+Land\_Outline+Lot\_Configuration+Property\_Slope+Neighborhood+House\_Type+Overall\_Material+House\_Condition+Construction\_Year+Remodel\_Year+Roof\_Design+Brick\_Veneer\_Area  
 ,data=Pr\_P\_Tr)  
  
summary(model1\_lm)

##   
## Call:  
## lm(formula = Sale\_Price ~ Heating\_Quality + Air\_Conditioning +   
## Electrical\_System + First\_Floor\_Area + Second\_Floor\_Area +   
## Grade\_Living\_Area + Underground\_Half\_Bathroom + Full\_Bathroom\_Above\_Grade +   
## Kitchen\_Above\_Grade + Kitchen\_Quality + Rooms\_Above\_Grade +   
## Functional\_Rate + Fireplaces + Fireplace\_Quality + Pool\_Area +   
## Garage + Garage\_Finish\_Year + Garage\_Quality + Garage\_Built\_Year +   
## Garage\_Condition + Pavedd\_Drive + BsmtFinSF1 + BsmtUnfSF +   
## Total\_Basement\_Area + Building\_Class + Zoning\_Class + Lot\_Extent +   
## Lot\_Size + Property\_Shape + Land\_Outline + Lot\_Configuration +   
## Property\_Slope + Neighborhood + House\_Type + Overall\_Material +   
## House\_Condition + Construction\_Year + Remodel\_Year + Roof\_Design +   
## Brick\_Veneer\_Area, data = Pr\_P\_Tr)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -292077 -17062 -1915 14460 232932   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -1.728e+05 5.501e+05 -0.314 0.753548   
## Heating\_QualityFa 1.035e+04 1.466e+04 0.706 0.480492   
## Heating\_QualityGd -3.788e+03 6.103e+03 -0.621 0.535178   
## Heating\_QualityTA 3.316e+03 6.244e+03 0.531 0.595617   
## Air\_ConditioningY 2.385e+04 1.790e+04 1.333 0.183225   
## Electrical\_SystemFuseF -7.003e+02 2.734e+04 -0.026 0.979576   
## Electrical\_SystemSBrkr -3.875e+03 1.084e+04 -0.357 0.720882   
## First\_Floor\_Area 8.797e+01 5.454e+01 1.613 0.107397   
## Second\_Floor\_Area 7.611e+01 5.365e+01 1.419 0.156635   
## Grade\_Living\_Area -3.359e+01 5.399e+01 -0.622 0.534129   
## Underground\_Half\_Bathroom 1.405e+04 7.613e+03 1.845 0.065581 .   
## Full\_Bathroom\_Above\_Grade 9.446e+03 5.483e+03 1.723 0.085570 .   
## Kitchen\_Above\_Grade -3.004e+04 3.293e+04 -0.912 0.362095   
## Kitchen\_QualityFa -2.562e+04 1.937e+04 -1.322 0.186637   
## Kitchen\_QualityGd -3.247e+04 7.045e+03 -4.609 5.19e-06 \*\*\*  
## Kitchen\_QualityTA -3.325e+04 9.391e+03 -3.540 0.000438 \*\*\*  
## Rooms\_Above\_Grade 4.056e+03 2.371e+03 1.710 0.087824 .   
## Functional\_RateMajD2 -1.253e+04 4.782e+04 -0.262 0.793446   
## Functional\_RateMD 1.336e+04 2.889e+04 0.463 0.643863   
## Functional\_RateMD1 -3.757e+03 2.436e+04 -0.154 0.877518   
## Functional\_RateMD2 -6.886e+03 2.416e+04 -0.285 0.775731   
## Functional\_RateMS 4.512e+03 5.216e+04 0.086 0.931106   
## Functional\_RateTF 8.505e+03 2.064e+04 0.412 0.680488   
## Fireplaces 1.143e+04 5.818e+03 1.964 0.050118 .   
## Fireplace\_QualityFa -2.390e+04 1.393e+04 -1.717 0.086699 .   
## Fireplace\_QualityGd -2.043e+04 1.025e+04 -1.994 0.046741 \*   
## Fireplace\_QualityPo -1.248e+04 1.741e+04 -0.717 0.473946   
## Fireplace\_QualityTA -2.465e+04 1.085e+04 -2.271 0.023557 \*   
## Pool\_Area -9.889e+00 3.655e+01 -0.271 0.786818   
## GarageAttchd 4.536e+04 4.608e+04 0.984 0.325406   
## GarageBasment 6.342e+04 4.834e+04 1.312 0.190220   
## GarageBuiltIn 5.138e+04 4.718e+04 1.089 0.276690   
## GarageCarPort 5.456e+04 6.374e+04 0.856 0.392383   
## GarageDetchd 4.926e+04 4.652e+04 1.059 0.290102   
## Garage\_Finish\_YearRFn -3.366e+03 4.983e+03 -0.676 0.499644   
## Garage\_Finish\_YearUnf -7.205e+03 6.958e+03 -1.036 0.300940   
## Garage\_QualityFa -1.369e+05 5.744e+04 -2.383 0.017556 \*   
## Garage\_QualityGd -1.290e+05 5.705e+04 -2.262 0.024164 \*   
## Garage\_QualityTA -1.454e+05 5.562e+04 -2.614 0.009234 \*\*   
## Garage\_Built\_Year 3.799e+01 1.836e+02 0.207 0.836142   
## Garage\_ConditionFa 1.634e+05 7.410e+04 2.205 0.027909 \*   
## Garage\_ConditionGd 7.274e+04 8.571e+04 0.849 0.396526   
## Garage\_ConditionPo 2.095e+05 8.654e+04 2.420 0.015872 \*   
## Garage\_ConditionTA 1.583e+05 7.267e+04 2.178 0.029910 \*   
## Pavedd\_DriveP -2.659e+04 1.939e+04 -1.371 0.171038   
## Pavedd\_DriveY -1.045e+04 1.584e+04 -0.660 0.509666   
## BsmtFinSF1 -6.687e+00 1.200e+01 -0.557 0.577478   
## BsmtUnfSF -2.474e+01 1.206e+01 -2.052 0.040750 \*   
## Total\_Basement\_Area 1.387e+01 1.384e+01 1.002 0.316747   
## Building\_Class -3.865e+02 1.615e+02 -2.394 0.017061 \*   
## Zoning\_ClassFVR 6.124e+04 5.458e+04 1.122 0.262437   
## Zoning\_ClassRHD -7.937e+04 8.183e+04 -0.970 0.332608   
## Zoning\_ClassRLD 4.335e+04 5.294e+04 0.819 0.413203   
## Zoning\_ClassRMD 4.005e+04 5.182e+04 0.773 0.440019   
## Lot\_Extent -1.009e+02 1.031e+02 -0.978 0.328447   
## Lot\_Size 8.482e-01 2.829e-01 2.998 0.002861 \*\*   
## Property\_ShapeIR2 -1.030e+04 1.281e+04 -0.804 0.421821   
## Property\_ShapeIR3 -5.985e+04 2.171e+04 -2.757 0.006053 \*\*   
## Property\_ShapeReg 1.148e+03 4.422e+03 0.260 0.795289   
## Land\_OutlineHLS 5.647e+04 1.421e+04 3.974 8.15e-05 \*\*\*  
## Land\_OutlineLow 4.159e+04 2.335e+04 1.781 0.075544 .   
## Land\_OutlineLvl 4.054e+04 1.126e+04 3.600 0.000351 \*\*\*  
## Lot\_ConfigurationCulDSac 2.300e+04 1.001e+04 2.298 0.021978 \*   
## Lot\_ConfigurationFR2P -2.426e+04 1.359e+04 -1.785 0.074830 .   
## Lot\_ConfigurationFR3P -3.922e+04 3.099e+04 -1.266 0.206273   
## Lot\_ConfigurationI -2.504e+03 5.252e+03 -0.477 0.633753   
## Property\_SlopeMS 2.168e+04 1.148e+04 1.889 0.059534 .   
## Property\_SlopeSS -4.948e+04 3.366e+04 -1.470 0.142275   
## NeighborhoodBlueste -8.711e+03 3.799e+04 -0.229 0.818742   
## NeighborhoodBrDale -1.734e+04 5.224e+04 -0.332 0.740099   
## NeighborhoodBrkSide -2.594e+04 2.668e+04 -0.972 0.331346   
## NeighborhoodClearCr -3.065e+04 2.402e+04 -1.276 0.202647   
## NeighborhoodCollgCr -6.959e+03 1.603e+04 -0.434 0.664459   
## NeighborhoodCrawfor -1.888e+04 2.082e+04 -0.907 0.364789   
## NeighborhoodEdwards -7.655e+04 1.943e+04 -3.940 9.32e-05 \*\*\*  
## NeighborhoodGilbert -1.143e+04 1.692e+04 -0.675 0.499688   
## NeighborhoodIDOTRR -1.222e+04 3.544e+04 -0.345 0.730324   
## NeighborhoodMeadowV -2.055e+04 3.113e+04 -0.660 0.509452   
## NeighborhoodMitchel -4.510e+04 2.150e+04 -2.098 0.036453 \*   
## NeighborhoodNAmes -4.423e+04 1.869e+04 -2.367 0.018334 \*   
## NeighborhoodNoRidge 3.689e+04 1.767e+04 2.087 0.037410 \*   
## NeighborhoodNPkVill -4.334e+03 2.452e+04 -0.177 0.859774   
## NeighborhoodNridgHt 3.518e+04 1.533e+04 2.295 0.022143 \*   
## NeighborhoodNWAmes -4.557e+04 1.798e+04 -2.534 0.011574 \*   
## NeighborhoodOldTown -4.999e+04 2.965e+04 -1.686 0.092386 .   
## NeighborhoodSawyer -3.346e+04 2.000e+04 -1.673 0.094939 .   
## NeighborhoodSawyerW -1.628e+04 1.695e+04 -0.960 0.337374   
## NeighborhoodSomerst -4.974e+02 1.827e+04 -0.027 0.978297   
## NeighborhoodStoneBr 4.603e+04 1.736e+04 2.652 0.008274 \*\*   
## NeighborhoodSWISU -5.273e+04 2.454e+04 -2.149 0.032166 \*   
## NeighborhoodTimber -7.762e+03 1.768e+04 -0.439 0.660863   
## NeighborhoodVeenker 1.491e+04 2.187e+04 0.682 0.495685   
## House\_Type2fmCon 5.825e+04 3.655e+04 1.594 0.111698   
## House\_TypeDuplex 8.518e+04 5.811e+04 1.466 0.143308   
## House\_TypeTwnhs 1.046e+03 2.466e+04 0.042 0.966168   
## House\_TypeTwnhsE 5.385e+03 1.837e+04 0.293 0.769608   
## Overall\_Material 1.582e+04 2.908e+03 5.441 8.40e-08 \*\*\*  
## House\_Condition 7.051e+03 2.696e+03 2.615 0.009202 \*\*   
## Construction\_Year -4.735e+01 2.496e+02 -0.190 0.849633   
## Remodel\_Year 3.250e+01 1.883e+02 0.173 0.863029   
## Roof\_DesignGable 6.111e+03 2.555e+04 0.239 0.811070   
## Roof\_DesignGambrel 7.417e+03 3.350e+04 0.221 0.824860   
## Roof\_DesignHip 1.195e+04 2.543e+04 0.470 0.638667   
## Roof\_DesignMansard 1.668e+04 3.358e+04 0.497 0.619631   
## Brick\_Veneer\_Area 1.596e+01 1.025e+01 1.557 0.120147   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 41020 on 486 degrees of freedom  
## (868 observations deleted due to missingness)  
## Multiple R-squared: 0.8371, Adjusted R-squared: 0.8022   
## F-statistic: 24.01 on 104 and 486 DF, p-value: < 2.2e-16

model2\_lm<-lm(Sale\_Price~Heating\_Quality+Air\_Conditioning+First\_Floor\_Area+Second\_Floor\_Area+Grade\_Living\_Area+Underground\_Half\_Bathroom+  
 Full\_Bathroom\_Above\_Grade+Kitchen\_Above\_Grade+Kitchen\_Quality+Rooms\_Above\_Grade+  
 Fireplaces+Fireplace\_Quality+Pool\_Area+Garage  
 +Garage\_Finish\_Year+Garage\_Quality+Garage\_Condition  
 +BsmtUnfSF+Building\_Class+Lot\_Size+Property\_Shape+Land\_Outline+Lot\_Configuration+Property\_Slope+Neighborhood+  
 House\_Type+Overall\_Material+House\_Condition+Construction\_Year+Brick\_Veneer\_Area,data=Pr\_P\_Tr)  
  
summary(model2\_lm)

##   
## Call:  
## lm(formula = Sale\_Price ~ Heating\_Quality + Air\_Conditioning +   
## First\_Floor\_Area + Second\_Floor\_Area + Grade\_Living\_Area +   
## Underground\_Half\_Bathroom + Full\_Bathroom\_Above\_Grade + Kitchen\_Above\_Grade +   
## Kitchen\_Quality + Rooms\_Above\_Grade + Fireplaces + Fireplace\_Quality +   
## Pool\_Area + Garage + Garage\_Finish\_Year + Garage\_Quality +   
## Garage\_Condition + BsmtUnfSF + Building\_Class + Lot\_Size +   
## Property\_Shape + Land\_Outline + Lot\_Configuration + Property\_Slope +   
## Neighborhood + House\_Type + Overall\_Material + House\_Condition +   
## Construction\_Year + Brick\_Veneer\_Area, data = Pr\_P\_Tr)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -330283 -16532 -1214 15268 224612   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -2.884e+05 3.477e+05 -0.830 0.407053   
## Heating\_QualityFa -1.188e+03 1.031e+04 -0.115 0.908317   
## Heating\_QualityGd -5.602e+03 4.707e+03 -1.190 0.234349   
## Heating\_QualityTA -1.713e+02 4.588e+03 -0.037 0.970223   
## Air\_ConditioningY 1.195e+04 1.403e+04 0.852 0.394706   
## First\_Floor\_Area 8.422e+01 4.712e+01 1.787 0.074348 .   
## Second\_Floor\_Area 6.557e+01 4.698e+01 1.396 0.163233   
## Grade\_Living\_Area -2.488e+01 4.724e+01 -0.527 0.598526   
## Underground\_Half\_Bathroom 7.394e+03 5.908e+03 1.252 0.211173   
## Full\_Bathroom\_Above\_Grade 6.475e+03 4.208e+03 1.539 0.124273   
## Kitchen\_Above\_Grade -2.297e+04 2.128e+04 -1.080 0.280655   
## Kitchen\_QualityFa -3.698e+04 1.584e+04 -2.335 0.019841 \*   
## Kitchen\_QualityGd -3.531e+04 6.012e+03 -5.874 6.68e-09 \*\*\*  
## Kitchen\_QualityTA -3.777e+04 7.460e+03 -5.064 5.31e-07 \*\*\*  
## Rooms\_Above\_Grade 2.890e+03 1.802e+03 1.604 0.109259   
## Fireplaces 8.586e+03 4.307e+03 1.993 0.046622 \*   
## Fireplace\_QualityFa -1.477e+04 1.134e+04 -1.303 0.193160   
## Fireplace\_QualityGd -1.427e+04 8.747e+03 -1.631 0.103261   
## Fireplace\_QualityPo -1.242e+04 1.343e+04 -0.924 0.355617   
## Fireplace\_QualityTA -1.689e+04 9.072e+03 -1.862 0.063085 .   
## Pool\_Area 2.004e+01 2.827e+01 0.709 0.478566   
## GarageAttchd 9.302e+03 3.082e+04 0.302 0.762849   
## GarageBasment 8.227e+03 3.290e+04 0.250 0.802577   
## GarageBuiltIn 1.310e+04 3.144e+04 0.417 0.677094   
## GarageCarPort -2.935e+04 4.177e+04 -0.703 0.482416   
## GarageDetchd 9.892e+03 3.126e+04 0.316 0.751787   
## Garage\_Finish\_YearRFn -4.586e+03 3.860e+03 -1.188 0.235242   
## Garage\_Finish\_YearUnf -4.247e+03 5.222e+03 -0.813 0.416342   
## Garage\_QualityFa -1.390e+05 5.043e+04 -2.756 0.006015 \*\*   
## Garage\_QualityGd -1.374e+05 5.053e+04 -2.719 0.006709 \*\*   
## Garage\_QualityTA -1.462e+05 4.932e+04 -2.965 0.003133 \*\*   
## Garage\_ConditionFa 1.470e+05 6.595e+04 2.229 0.026171 \*   
## Garage\_ConditionGd 1.424e+05 6.819e+04 2.088 0.037137 \*   
## Garage\_ConditionPo 1.610e+05 7.169e+04 2.246 0.025041 \*   
## Garage\_ConditionTA 1.484e+05 6.490e+04 2.286 0.022549 \*   
## BsmtUnfSF -1.489e+01 3.723e+00 -3.999 7.06e-05 \*\*\*  
## Building\_Class -2.905e+02 1.045e+02 -2.780 0.005581 \*\*   
## Lot\_Size 5.219e-01 1.732e-01 3.013 0.002679 \*\*   
## Property\_ShapeIR2 -5.973e+03 8.785e+03 -0.680 0.496789   
## Property\_ShapeIR3 -3.716e+04 1.440e+04 -2.581 0.010062 \*   
## Property\_ShapeReg 1.231e+03 3.432e+03 0.359 0.719906   
## Land\_OutlineHLS 4.859e+04 1.091e+04 4.452 9.93e-06 \*\*\*  
## Land\_OutlineLow 4.493e+04 1.421e+04 3.163 0.001633 \*\*   
## Land\_OutlineLvl 3.074e+04 8.618e+03 3.567 0.000386 \*\*\*  
## Lot\_ConfigurationCulDSac 1.581e+04 6.255e+03 2.529 0.011681 \*   
## Lot\_ConfigurationFR2P -1.652e+04 9.422e+03 -1.753 0.080015 .   
## Lot\_ConfigurationFR3P -3.938e+04 2.783e+04 -1.415 0.157574   
## Lot\_ConfigurationI -1.233e+03 3.918e+03 -0.315 0.753120   
## Property\_SlopeMS 1.492e+04 8.319e+03 1.794 0.073263 .   
## Property\_SlopeSS -3.056e+04 1.865e+04 -1.638 0.101803   
## NeighborhoodBlueste -1.169e+04 3.060e+04 -0.382 0.702707   
## NeighborhoodBrDale -2.228e+04 4.408e+04 -0.505 0.613399   
## NeighborhoodBrkSide -2.222e+04 1.814e+04 -1.225 0.220983   
## NeighborhoodClearCr -1.758e+04 1.673e+04 -1.051 0.293849   
## NeighborhoodCollgCr -8.915e+03 1.298e+04 -0.687 0.492387   
## NeighborhoodCrawfor -1.343e+04 1.602e+04 -0.838 0.402137   
## NeighborhoodEdwards -6.709e+04 1.579e+04 -4.248 2.46e-05 \*\*\*  
## NeighborhoodGilbert -1.800e+04 1.362e+04 -1.322 0.186750   
## NeighborhoodIDOTRR -2.242e+04 2.296e+04 -0.976 0.329249   
## NeighborhoodMeadowV -2.112e+04 2.094e+04 -1.008 0.313586   
## NeighborhoodMitchel -3.489e+04 1.658e+04 -2.104 0.035713 \*   
## NeighborhoodNAmes -4.008e+04 1.455e+04 -2.755 0.006031 \*\*   
## NeighborhoodNoRidge 3.427e+04 1.435e+04 2.388 0.017228 \*   
## NeighborhoodNPkVill -3.284e+03 1.978e+04 -0.166 0.868174   
## NeighborhoodNridgHt 3.261e+04 1.275e+04 2.557 0.010781 \*   
## NeighborhoodNWAmes -4.020e+04 1.406e+04 -2.860 0.004363 \*\*   
## NeighborhoodOldTown -4.670e+04 1.882e+04 -2.481 0.013331 \*   
## NeighborhoodSawyer -3.355e+04 1.546e+04 -2.170 0.030348 \*   
## NeighborhoodSawyerW -1.736e+04 1.398e+04 -1.242 0.214658   
## NeighborhoodSomerst 5.894e+03 1.319e+04 0.447 0.655206   
## NeighborhoodStoneBr 3.980e+04 1.443e+04 2.757 0.005986 \*\*   
## NeighborhoodSWISU -4.804e+04 1.981e+04 -2.425 0.015570 \*   
## NeighborhoodTimber -1.712e+04 1.460e+04 -1.173 0.241409   
## NeighborhoodVeenker 1.291e+04 1.755e+04 0.736 0.462216   
## House\_Type2fmCon 3.804e+04 2.494e+04 1.525 0.127633   
## House\_TypeDuplex 1.461e+04 2.673e+04 0.547 0.584757   
## House\_TypeTwnhs -5.785e+03 1.830e+04 -0.316 0.752085   
## House\_TypeTwnhsE -3.129e+03 1.215e+04 -0.258 0.796845   
## Overall\_Material 1.609e+04 2.148e+03 7.490 2.16e-13 \*\*\*  
## House\_Condition 7.081e+03 1.872e+03 3.782 0.000169 \*\*\*  
## Construction\_Year 1.373e+02 1.719e+02 0.798 0.424912   
## Brick\_Veneer\_Area 1.984e+01 8.139e+00 2.438 0.015029 \*   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 38090 on 675 degrees of freedom  
## (702 observations deleted due to missingness)  
## Multiple R-squared: 0.8258, Adjusted R-squared: 0.8049   
## F-statistic: 39.52 on 81 and 675 DF, p-value: < 2.2e-16