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**Multi-Linear prediction model**

For full project, please follow the link <https://github.com/al-naimi/SpringBoard-Projects/blob/master/Multi-linear%20regression%20Prediction%20model.ipynb>

**Summary of Multi-linear prediction model:** The model is Ordinary Least Square (OLS) and the process is Backward Elimination.

**Day1:**

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| **OLS Regression Results for Day1 (1st iteration)** | | | |
| **Dep. Variable:** | y | **R-squared:** | 0.016 |
| **Model:** | OLS | **Adj. R-squared:** | -0.010 |
| **Method:** | Least Squares | **F-statistic:** | 0.6058 |
| **Date:** | Sun, 22 Oct 2017 | **Prob (F-statistic):** | 0.696 |
| **Time:** | 11:05:19 | **Log-Likelihood:** | -467.40 |
| **No. Observations:** | 194 | **AIC:** | 946.8 |
| **Df Residuals:** | 188 | **BIC:** | 966.4 |
| **Df Model:** | 5 |  |  |
| **Covariance Type:** | nonrobust |  |  |

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|  | **coef** | **std err** | **t** | **P>|t|** | **[0.025** | **0.975]** |
| **const** | 1.2632 | 0.481 | 2.629 | 0.009 | 0.315 | 2.211 |
| **x1** | -0.2521 | 0.395 | -0.639 | 0.524 | -1.030 | 0.526 |
| **x2 (Housing)** | 0.5761 | 0.395 | 1.460 | 0.146 | -0.202 | 1.354 |
| **x3** | 0.1000 | 0.545 | 0.183 | 0.855 | -0.976 | 1.176 |
| **x4** | -0.2317 | 0.557 | -0.416 | 0.678 | -1.331 | 0.868 |
| **x5** | -0.0564 | 0.553 | -0.102 | 0.919 | -1.148 | 1.035 |

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| **Omnibus:** | 89.802 | **Durbin-Watson:** | 1.778 |
| **Prob(Omnibus):** | 0.000 | **Jarque-Bera (JB):** | 249.866 |
| **Skew:** | 2.076 | **Prob(JB):** | 5.52e-55 |
| **Kurtosis:** | 6.698 | **Cond. No.** | 5.84 |

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| **OLS Regression Results for Day1 (2nd iteration)** | | | |
| **Dep. Variable:** | y | **R-squared:** | 0.016 |
| **Model:** | OLS | **Adj. R-squared:** | -0.005 |
| **Method:** | Least Squares | **F-statistic:** | 0.7586 |
| **Date:** | Sun, 22 Oct 2017 | **Prob (F-statistic):** | 0.553 |
| **Time:** | 11:05:19 | **Log-Likelihood:** | -467.40 |
| **No. Observations:** | 194 | **AIC:** | 944.8 |
| **Df Residuals:** | 189 | **BIC:** | 961.1 |
| **Df Model:** | 4 |  |  |
| **Covariance Type:** | nonrobust |  |  |

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|  | **coef** | **std err** | **t** | **P>|t|** | **[0.025** | **0.975]** |
| **const** | 1.2350 | 0.392 | 3.150 | 0.002 | 0.462 | 2.008 |
| **x1** | -0.2510 | 0.393 | -0.638 | 0.524 | -1.027 | 0.525 |
| **x2** | 0.5772 | 0.393 | 1.467 | 0.144 | -0.199 | 1.353 |
| **x3** | 0.1272 | 0.475 | 0.268 | 0.789 | -0.810 | 1.064 |
| **x4** | -0.2046 | 0.488 | -0.419 | 0.676 | -1.168 | 0.759 |

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| **Omnibus:** | 90.175 | | **Durbin-Watson:** | | 1.778 |
| **Prob(Omnibus):** | 0.000 | | **Jarque-Bera (JB):** | | 252.433 |
| **Skew:** | 2.081 | | **Prob(JB):** | | 1.53e-55 |
| **Kurtosis:** | 6.728 | | **Cond. No.** | | 4.14 |
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| **OLS Regression Results for Day1 (3rd iteration)** | | | | | | |
| **Dep. Variable:** | | y | | **R-squared:** | | 0.015 |
| **Model:** | | OLS | | **Adj. R-squared:** | | -0.000 |
| **Method:** | | Least Squares | | **F-statistic:** | | 0.9924 |
| **Date:** | | Sun, 22 Oct 2017 | | **Prob (F-statistic):** | | 0.398 |
| **Time:** | | 11:05:19 | | **Log-Likelihood:** | | -467.44 |
| **No. Observations:** | | 194 | | **AIC:** | | 942.9 |
| **Df Residuals:** | | 190 | | **BIC:** | | 955.9 |
| **Df Model:** | | 3 | |  | |  |
| **Covariance Type:** | | nonrobust | |  | |  |

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|  | **coef** | **std err** | **t** | **P>|t|** | **[0.025** | **0.975]** |
| **const** | 1.2794 | 0.354 | 3.609 | 0.000 | 0.580 | 1.979 |
| **x1** | -0.2572 | 0.392 | -0.657 | 0.512 | -1.030 | 0.515 |
| **x2** | 0.5800 | 0.392 | 1.479 | 0.141 | -0.194 | 1.354 |
| **x3** | -0.2472 | 0.461 | -0.537 | 0.592 | -1.156 | 0.661 |

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| **Omnibus:** | 90.369 | **Durbin-Watson:** | 1.780 |
| **Prob(Omnibus):** | 0.000 | **Jarque-Bera (JB):** | 253.630 |
| **Skew:** | 2.085 | **Prob(JB):** | 8.41e-56 |
| **Kurtosis:** | 6.740 | **Cond. No.** | 3.45 |

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| **OLS Regression Results Day1 (4th iteration)** | | | |
| **Dep. Variable:** | y | **R-squared:** | 0.014 |
| **Model:** | OLS | **Adj. R-squared:** | 0.004 |
| **Method:** | Least Squares | **F-statistic:** | 1.350 |
| **Date:** | Sun, 22 Oct 2017 | **Prob (F-statistic):** | 0.262 |
| **Time:** | 11:05:20 | **Log-Likelihood:** | -467.59 |
| **No. Observations:** | 194 | **AIC:** | 941.2 |
| **Df Residuals:** | 191 | **BIC:** | 951.0 |
| **Df Model:** | 2 |  |  |
| **Covariance Type:** | nonrobust |  |  |

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|  | **coef** | **std err** | **t** | **P>|t|** | **[0.025** | **0.975]** |
| **const** | 1.2141 | 0.332 | 3.653 | 0.000 | 0.559 | 1.870 |
| **x1** | -0.2598 | 0.391 | -0.665 | 0.507 | -1.031 | 0.511 |
| **x2** | 0.5951 | 0.391 | 1.524 | 0.129 | -0.175 | 1.365 |

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| **Omnibus:** | 91.313 | **Durbin-Watson:** | 1.780 |
| **Prob(Omnibus):** | 0.000 | **Jarque-Bera (JB):** | 259.591 |
| **Skew:** | 2.102 | **Prob(JB):** | 4.27e-57 |
| **Kurtosis:** | 6.800 | **Cond. No.** | 3.13 |

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| **OLS Regression Results Day1 (5th iteration)** | | | |
| **Dep. Variable:** | y | **R-squared:** | 0.012 |
| **Model:** | OLS | **Adj. R-squared:** | 0.007 |
| **Method:** | Least Squares | **F-statistic:** | 2.264 |
| **Date:** | Sun, 22 Oct 2017 | **Prob (F-statistic):** | 0.134 |
| **Time:** | 11:05:20 | **Log-Likelihood:** | -467.81 |
| **No. Observations:** | 194 | **AIC:** | 939.6 |
| **Df Residuals:** | 192 | **BIC:** | 946.2 |
| **Df Model:** | 1 |  |  |
| **Covariance Type:** | nonrobust |  |  |

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|  | **coef** | **std err** | **t** | **P>|t|** | **[0.025** | **0.975]** |
| **const** | 1.0968 | 0.281 | 3.900 | 0.000 | 0.542 | 1.651 |
| **x1 (Housing)** | 0.5864 | 0.390 | 1.505 | 0.134 | -0.182 | 1.355 |

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| **Omnibus:** | 91.254 | **Durbin-Watson:** | 1.772 |
| **Prob(Omnibus):** | 0.000 | **Jarque-Bera (JB):** | 258.781 |
| **Skew:** | 2.102 | **Prob(JB):** | 6.40e-57 |
| **Kurtosis:** | 6.786 | **Cond. No.** | 2.67 |

**Conclusion Day1**

Housing (P vs S) is the main factor that is involved in the excretion outcome for Day1. The p-value of Housing was the lowest one throughout the process of Backward Elimination.

**Conclusion Day2**

Housing (P vs S) is one of the main 2 factors that are involved in the excretion outcome for Day2. The p-value of Housing stayed low and consistence throughout the process of Backward Elimination.

**Conclusion Day3**

Housing (P vs S) is one of the main 2 factors that are involved in the excretion outcome for Day3. The p-value of Housing was not low but consistence throughout the process of Backward Elimination.

**Conclusion Total**

Housing (P vs S) is one of the main 2 factors that are involved in the excretion outcome for Day3. The p-value of Housing was not low but consistence throughout the process of Backward Elimination.

Note: Find the details of iterations for Day2, Day3, and Total on the full version of the project <https://github.com/al-naimi/SpringBoard-Projects/blob/master/Multi-linear%20regression%20Prediction%20model.ipynb>