**Time Complexity Analysis of Normality Test**

Note : In result table outcome indicates whether the test has given correct result or not. Correct means statistical test is able capture whether the data is following univariate/multi variate normal distribution or not and Incorrect means it is unable to capture

* **Univariate Normality**

**Normally Distributed Data**

Data Size : 5x107

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Anderson Darling Test | 17.2347 | Correct |
| Kolmogorov Smirnov Test | 11.6634 | Correct |
| Shapiro Wilk Test | 6.3075 | Incorrect |
| Lilliefors Test | 8.3322 | Correct |
| Jarque Bera Test | 2.9535 | Correct |
| D’Agostino’s K-squared Test | 2.9459 | Correct |

Data Size : 10x107

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Anderson Darling Test | 27.3019 | Correct |
| Kolmogorov Smirnov Test | 16.9221 | Correct |
| Shapiro Wilk Test | 12.4709 | Incorrect |
| Lilliefors Test | 16.9168 | Correct |
| Jarque Bera Test | 5.6403 | Correct |
| D’Agostino’s K-squared Test | 5.8719 | Correct |

**Non-Normally Distributed Data**

Data Size : 5x107

Distribution : Non-Normal

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Anderson Darling Test | 13.4498 | Correct |
| Kolmogorov Smirnov Test | 8.2938 | Correct |
| Shapiro Wilk Test | 6.1416 | Correct |
| Lilliefors Test | 8.3692 | Correct |
| Jarque Bera Test | 2.9700 | Correct |
| D’Agostino’s K-squared Test | 3.0162 | Correct |

* **Multivariate Normality**

**Normally Distributed Data**

Data Size : (5x106 , 25)

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Shapiro Wilk Test | 15.9215 | Incorrect |
| Jarque Bera Test | 7.1043 | Correct |
| Doornik Hansen Test | > 15 minutes | Correct |
| Lilliefors Test | > 15 minutes | Correct |

Data Size : (5x105, 20)

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Shapiro Wilk Test | 1.1096 | Incorrect |
| Jarque Bera Test | 0.5591 | Correct |
| Doornik Hansen Test | 61.3557 | Correct |
| Lilliefors Test | 26.3013 | Correct |

Data Size : (5x105, 15)

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Shapiro Wilk Test | 1.0925 | Correct |
| Jarque Bera Test | 0.5446 | Correct |
| Doornik Hansen Test | 49.2022 | Correct |
| Lilliefors Test | 27.7504 | Correct |

Data Size : (5x105, 10)

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Shapiro Wilk Test | 0.6585 | Correct |
| Jarque Bera Test | 0.4010 | Correct |
| Doornik Hansen Test | 34.9484 | Correct |
| Lilliefors Test | 19.6660 | Correct |

Data Size : (5x105, 5)

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Shapiro Wilk Test | 0.3377 | Correct |
| Jarque Bera Test | 0.1966 | Correct |
| Doornik Hansen Test | 17.0863 | Correct |
| Lilliefors Test | 9.6839 | Correct |

Data Size : (10x105, 20)

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Shapiro Wilk Test | 2.8768 | Correct |
| Jarque Bera Test | 1.8265 | Correct |
| Doornik Hansen Test | 132.4053 | Correct |
| Lilliefors Test | 80.7546 | Correct |

Data Size : (10x105, 15)

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Shapiro Wilk Test | 2.2120 | Incorrect |
| Jarque Bera Test | 1.0808 | Correct |
| Doornik Hansen Test | 108.3259 | Correct |
| Lilliefors Test | 61.2058 | Correct |

Data Size : (10x105, 10)

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Shapiro Wilk Test | 1.4881 | Incorrect |
| Jarque Bera Test | 0.8523 | Correct |
| Doornik Hansen Test | 79.2434 | Correct |
| Lilliefors Test | 45.8795 | Correct |

Data Size : (10x105, 5)

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Shapiro Wilk Test | 0.7379 | Correct |
| Jarque Bera Test | 0.3772 | Correct |
| Doornik Hansen Test | 42.8096 | Correct |
| Lilliefors Test | 21.3581 | Correct |

**Non-Normally Distributed Data**

Data Size : (5x106 , 25)

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Shapiro Wilk Test | 14.5100 | Incorrect |
| Jarque Bera Test | 7.3115 | Correct |
| Doornik Hansen Test | > 15 minutes | Correct |
| Lilliefors Test | > 15 minutes | Correct |

Data Size : (2.5x105, 20)

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Shapiro Wilk Test | 0.6906 | Correct |
| Jarque Bera Test | 0.3339 | Correct |
| Doornik Hansen Test | 36.4476 | Correct |
| Lilliefors Test | 16.5263 | Correct |

Data Size : (2.5x105, 15)

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Shapiro Wilk Test | 0.4867 | Correct |
| Jarque Bera Test | 0.2463 | Correct |
| Doornik Hansen Test | 28.3160 | Correct |
| Lilliefors Test | 14.4789 | Correct |

Data Size : (2.5x105, 10)

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Shapiro Wilk Test | 0.3281 | Correct |
| Jarque Bera Test | 0.1673 | Correct |
| Doornik Hansen Test | 14.0654 | Correct |
| Lilliefors Test | 8.9414 | Correct |

Data Size : (2.5x105, 5)

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Shapiro Wilk Test | 0.1721 | Correct |
| Jarque Bera Test | 0.0824 | Correct |
| Doornik Hansen Test | 6.4894 | Correct |
| Lilliefors Test | 4.3624 | Correct |

Data Size : (2.5x106, 20)

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Shapiro Wilk Test | 7.4319 | Correct |
| Jarque Bera Test | 3.8056 | Correct |
| Doornik Hansen Test | 333.2277 | Correct |
| Lilliefors Test | 208.0355 | Correct |

Data Size : (2.5x106, 15)

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Shapiro Wilk Test | 5.9475 | Correct |
| Jarque Bera Test | 2.8470 | Correct |
| Doornik Hansen Test | 291.9683 | Correct |
| Lilliefors Test | 169.2367 | Correct |

Data Size : (2.5x106, 10)

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Shapiro Wilk Test | 3.8517 | Correct |
| Jarque Bera Test | 1.8501 | Correct |
| Doornik Hansen Test | 221.4554 | Correct |
| Lilliefors Test | 117.8115 | Correct |

Data Size : (2.5x106, 5)

|  |  |  |
| --- | --- | --- |
| Statistical Test | Time Taken (in seconds) | Outcome |
| Shapiro Wilk Test | 1.8688 | Correct |
| Jarque Bera Test | 0.9422 | Correct |
| Doornik Hansen Test | 106.4783 | Correct |
| Lilliefors Test | 52.5599 | Correct |