Problem 8:

**Establishing Relation between Logical SLOC and WMC Obtained from METRICSTICS**

**(a) Scatter Plot**

Figure 8.2 shows the scatter plot between the data for Logical SLOC and WMC obtained from METRICSTICS. By visualizing the data points on a scatter plot, we can observe patterns and trends. WMC stands for “Weighted Methods per Class”. It is a metric used to measure the complexity of a class and provides an indication of how many methods within a class are present and how complex those methods are. Logical SLOC is a measure of the size or complexity of a software project based on the number of logical statements or instructions in the source code that affect the program’s control flow or behavior Plotting these values on scatter plot provides us with an insight on the effect of SLOC on WMC for a given system.

|  |  |  |
| --- | --- | --- |
| **Class** | **WMC** | **Logical SLOC** |
| LoginDialog | 8 | 41 |
| GenerateDataDialog | 9 | 28 |
| EnterDataDialog | 10 | 27 |
| RightFrame | 12 | 192 |
| LeftFrame | 14 | 56 |
| MetricsticsApp | 30 | 137 |
| MiddleFrame | 38 | 145 |
| Calculator | 44 | 118 |

Table 8.1 Class Metrics

Figure 8.2 Scatter Plot (Logical SLOC and WMC)

**(b) Correlation Efficient**

In this section we find the correlation coefficient between WMC and SLOC(L). By plotting the WMC values and SLOC(L) values separately on a histogram, we can conclude that these values are not normally distributed.

Since the values of x’s [WMC] and y’s are non-normally distributed as shown in the figure [8.4], The Spearman’s Rank Correlation Coefficient (rs) can be used to find the correlation coefficient . The Spearman’s Rank Correlation Coefficient (rs) is a measure of association for attributes values that are not distributed normally [Lecture Slides]. Let the data in each set of WMC(x) and SLOC(L)(y) be ranked separately in ascending order by rank (xi) and rank (yi). n is the number of pairs of (x,y) di = rank (xi) – rank (yi). Then, rs is given by

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The value of n is 5 for this particular system. All calculations are done based on the values from table 8.3. Spearman’s Rank Correlation Coefficient can range from -1 to 1. The closer the value is to 1 the stronger the correlation it will have. For the system of METRICSTICS the coefficient value is 0.6 which shows a strong correlation between WMC and SLOC(L). The value of coefficient suggests that in case the logical SLOC increases there is a high chance WMC will increase too. But conclusively we cannot say only SLOC has an impact on WMC or vice versa but many other underlying factors may also have an effect on these values. It is important to take in account all metrics of software to make justification of change.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **WMC(xi)** | **Rank(xi)** | **Logical SLOC(yi)** | **Rank(yi)** | **d** | **d^2** |
| 8 | 1 | 41 | 3 | -2 | 4 |
| 9 | 2 | 28 | 1 | 1 | 1 |
| 10 | 3 | 27 | 2 | 1 | 1 |
| 12 | 4 | 192 | 8 | -4 | 16 |
| 14 | 5 | 56 | 4 | 1 | 1 |
| 30 | 6 | 137 | 6 | 0 | 0 |
| 38 | 7 | 145 | 7 | 0 | 0 |
| 44 | 8 | 118 | 5 | 3 | 9 |

Table 8.3 Data Table

Figure 8.4: Correlation Efficient (WMC)

Figure 8.4: Correlation Efficient (Logical SLOC)