CHAPTER 6

RESULTS AND DISCUSSION

6.1 INTRODUCTION

In this section, evaluation of the proposed research methodologies is done in the java simulation environment in order to predict their fault detection capability. Each work is implemented and simulated under various configuration parameters to know their performance measure values. As discussed earlier our first research work is to find the fault prone classes in the design level. And the second research work is to evaluate the cohesion and coupling measures using java reflection. And finally third research work is to classify the types of faults using ANFIS prediction scheme.

The performance measures that are considered for evaluating the improvement of the proposed research methodologies are, “Sensitivity, Specificity, Precision, Delay and Efficiency”. The comparison results of this performance metrics are illustrated and explained in the following sub sections.

6.2 SENSITIVITY

Sensitivity (also called the true positive rate, the recall, or probability of detection in some fields) measures the proportion of positives
that are correctly identified as such (e.g., the percentage of sick people who are correctly identified as having the condition). Sensitivity refers to the test's ability to correctly detect patients who do have the condition. In the example of a medical test used to identify a disease, the sensitivity of the test is the proportion of people who test positive for the disease among those who have the disease. Mathematically, this can be expressed as:

\[
\text{Sensitivity} = \frac{\text{Number of true positives}}{\text{Number of true positives} + \text{Number of false negatives}}
\]

The graphical representation of the sensitivity measurement values of the proposed research methodology is given in figure 6.1.

![Figure 6.1 Sensitivity Measure](image)

In figure 6.1 Sensitivity measure comparisons of the proposed research methodologies is given. This graph proves that the proposed research method can accurately predict the faults present in the software efficiently with improved performance.
6.3 SPECIFICITY

Specificity (also called the true negative rate) measures the proportion of negatives that are correctly identified as such (e.g., the percentage of healthy people who are correctly identified as not having the condition). Specificity relates to the test’s ability to correctly detect patients without a condition. Consider the example of a medical test for diagnosing a disease. Specificity of a test is the proportion of healthy patients known not to have the disease, who will test negative for it. Mathematically, this can also be written as:

\[
\text{Specificity} = \frac{\text{number of true negatives}}{\text{number of true negatives} + \text{number of false positives}}
\]

The graphical representation of the specificity measurement values of the proposed research methodology is given in figure 6.2.
In figure 6.2 specificity measure comparisons of the proposed research methodologies is given. This graph proves that the proposed research method can accurately predict the faults present in the software efficiently with improved performance.

6.4 PRECISION

In the field of information retrieval, precision is the fraction of retrieved documents that are relevant to the query:

\[
\text{Precision} = \frac{|\{\text{relevant documents}\} \cap \{\text{retrieved documents}\}|}{|\{\text{relevant documents}\}|}
\]

Precision takes all retrieved documents into account, but it can also be evaluated at a given cut-off rank, considering only the topmost results returned by the system.

![Precision comparison](image-url)
In figure 6.3 precision measure comparisons of the proposed research methodologies is given. This graph proves that the proposed research method can accurately predict the faults present in the software efficiently with improved performance.

6.5 DELAY

Delay is defined as the time taken to find the number of faults present in the software. The delay should be less to lead to efficient software development which can be done on time. The comparison of the delay consumed for proposed research methodologies are illustrated in the figure 6.4.

![Figure 6.4 Delay comparison](image-url)
6.6 SUMMARY

In this chapter performance evaluation of the different proposed research methodologies are done under different performance metrics. From this analysis it is proved that the proposed research methodology leads to provide the better results in terms of improved accuracy and precision in terms correctly identifying the faults present in the system.