CHAPTER 5
CONCURRENCY CONTROL USING FUZZY LOGIC

5.1 INTRODUCTION

Fuzzy Logic (FL) is a multi-valued logic that allows intermediate values to be defined between conventional evaluations like true/false, yes/no, high/low. Fuzzy systems are an alternative to traditional notions of set membership and logic.

The training and testing fuzzy logic is to map the input pattern with target output data. For this, the inbuilt function has to prepare membership table and finally a set of number is stored. During testing, the membership function is used to test the pattern.

Training Fuzzy logic

Step 1: Read the pattern and its target value.
Step 2: Create Fuzzy membership function.
Step 4: Process with target values.
Step 5: Obtain final weights.

Testing Fuzzy logic

Step 1: Input a pattern.
Step 2: Process with Fuzzy membership function.
Step 5: Find the cluster to which the pattern belongs.
Step 4: Obtain estimated target values.
Step 5: Classify the status
5.2 SEQUENCE OF MODULES EXECUTED WHEN A TRANSACTION REQUESTS LOCK (FL TRAINING) OR RELEASES LOCK (FL TESTING)

The step 1 to step 4 for case 1, case 2 and case 3 are executed to produce performance metrics.

1. The training of the FL is initiated when transaction $T_i$ requests lock on objects ($O_1, O_2, \ldots, O_n$). The final matrices are stored into a file for testing purpose.

2. OL testing is executed with objects ($O_1, O_2, \ldots, O_n$) in step 2 to obtain binary value. If ‘000’ is obtained in the output layer, then the object(s) can be locked. If (001, 010, 011, 100) is obtained in output layer of OL testing, then the object(s) is under use.

3. In any case, if transaction $T_i$ is requested on object $O_i$, then OL training update weights inclusive of new patterns using the Fuzzy logic.

4. In any case, if the object is under any lock mode other than shared or no lock, then the transactions are kept under queue.

5.3 RESULTS AND DISCUSSIONS

Figure 5.1 to Figure 5.12 shows the performance of CC during locking and releasing for objects fork, bolted connection and bearing. Objects fork, bolted connection and bearing. The performances have been evaluated using fuzzy logic under controlled simulation environment. The releasing time, locking time for various transactions of a drawing depends on the the processor capabilities, speed of the RAM and memory occupation.
5.3.1 FORK DRAWING

Fig. 5.1 Releasing time for each object in Fork

Fig. 5.2 Locking time for each object in Fork
Fig. 5.3 Total Locking time for each transaction group in Fork

Fig. 5.4 Total Releasing time for each transaction group in Fork
5.3.2 BOLTED CONNECTION DRAWING

Fig. 5.5 Releasing time for each object in Bolted connection

Fig. 5.6 Locking time for each object in Bolted connection
Fig. 5.7 Total Locking time for each transaction group in Bolted connection

Fig. 5.8 Total Releasing time for each transaction group in Bolted connection
5.3.3 BEARING DRAWING

Fig. 5.9 Releasing time for each object in Bearing

Fig. 5.10 Locking time for each object in Bearing
Fig. 5.11 Total Locking time for each transaction group in Bearing

Fig. 5.12 Total Releasing time for each transaction group in Bearing
5.4 SUMMARY

The FL algorithm takes less number of iterations to reach a stable state. The time taken by this algorithm is in between the time taken by LWPR and time taken by FUBPA. Chapter 6 presents the comparison of performance of metrics like releasing time for each object, locking time for each object, total locking time for each transaction group and total releasing time for each transaction group by FUBPA, LWPR and FL have been presented for Fork, Bolted connection and Bearing.