# List of Tables


2.1 Contingency table I. Here, each $n_{ij}$ denotes the number of nodes in common between communities $C_i$ and $R_j : n_{ij} = |C_i \cap R_j|$. . . . . 26
2.2 Contingency table II. . . . . 27

3.1 Accuracy metric values in various datasets having ground truth communities. . . . . 52
3.2 Quality metric values for datasets having ground truth communities. . . . 54
3.3 Quality metric values for datasets whose ground truth are unavailable. . . 56
3.4 MCDM ranking score obtained with 75% accuracy and 25% quality. . . . 58
3.5 Summary of complexity of community detection algorithms. . . . . 67

4.1 Time complexity comparison of proposed FuzAg with GAFCD, FMM/H2, CFGC and MDP . . . . . 83
4.2 Real-world networks used in the experiments . . . . . 85
4.3 Range of number of communities $(k)$ for GAFCD, FMM/H2 and CFGC on each network . . . . . 86
4.4 Best quality metrics' values with $(k/iter)$ for disjoint communities predicted over 100 runs . . . . . 87
4.5 Mean (top) and standard deviation (bottom) of quality metrics' values for disjoint communities predicted over 100 runs of each algorithm-part I . . 89
4.6 Mean (top) and standard deviation (bottom) of quality metrics' values for disjoint communities predicted over 100 runs of each algorithm-part II . . 90
4.7 Mean, Standard deviation, best with $(k/iter)$ fuzzy modularity for overlapping crisp communities . . . . . 91
4.8 Mean and standard deviation and best with $(k/iter)$ of accuracy metrics' values for disjoint communities . . . . . 92
4.9 Comparison of execution time (seconds) required for 100 runs . . . . . 93
4.10 MCDM ranking score obtained with 75% accuracy and 25% quality. . . . 95

5.1 Benchmark functions . . . . . 115
5.2 Initial range and Optima . . . . . 116
5.3 Comparison of PSO and PSOCA . . . . . 117
5.4 Comparison of PSO-CATV with PSO-TVIW, PSO-TVAC and jDE part I . 118
5.5 Comparison of PSO-CATV with PSO-TVIW, PSO-TVAC and jDE part II 119

6.1 Comparison of CLP-EB, CLP-EP, and CLP-ES in terms of accuracy quantified by AUC . . . . . 136
6.2 Comparison of CLP-EB, CLP-EP, and CLP-ES in terms of accuracy quantified by Precison . . . . . 137
6.3 Comparison of CLP-EB, CLP-EP, and CLP-ES in terms of Ranking Score (RS) . . . . . 138
6.4 $W$-values obtained with Wilcoxon rank test for AUC, Precision and RS values on four networks . . . . . 138

7.1 Combination of AVI, AVU and ANUI with indication of clustering quality and accuracy. . . . . 179
7.2 Summary of high MCDM scores in the curve and meaning in terms of RITA and bias of algorithms. . . . . 186
7.3 Average of accuracy metrics and quality metrics values. . . . . 186