We have presented experimental analysis of following algorithms in previous chapters:

- Random number selection algorithm,
- Random degree selection algorithm and
- Action set based algorithm.

All three algorithms have their own nature of computation

- Random degree selection algorithm is independent of number of nodes, with graphs having the same degree and different n (i.e., size of the graph). Algorithm produces almost similar results for the manual graph in multiple simulations of the algorithm.
- Random number selection algorithm is independent of the degree of the graph. It produces different results in multiple simulations for manual and random graphs. In every round unique random number is assigned to each node for computation.
- In a similar way, action set based algorithm also produces different results in multiple simulations for the manual and random graph.

### 6.1 SUMMARY AND CONCLUSIONS

RNSA Algorithm’s execution takes place in seconds due to less complexity and it requires optimized colors to color independent sets. It assigns colors according to independent sets and in this algorithm each node needs to inform all of its neighbors when it deciding to join MIS or not. Independent sets and colorings are related means
each color in a valid coloring constitutes an independent set. This algorithm chooses all nodes of the higher random number. Each node is removed with constant probability in each round. During execution of algorithm, one strong constraint is applied that is vertices selected in one independent set should not be neighbors together.

Second is Random Degree Selection algorithm which is applicable for converting the algorithm into a deterministic algorithm. This algorithm provides a solution in reasonable time. Maximum and minimum degree probability ensure efficient independent sets, no two vertices are adjacent in a set. Here, we explain the deterministic algorithm to compute MIS on mobile network modeled as a mobile graph and randomly created graph of fixed degree. Random degree based algorithm is implemented in two ways. First has randomly created graph in which we compute maximum and minimum degree probability of vertices than their neighbors. The second is a manually created graph of fixed vertices and fixed edges and computes maximum and minimum degree probability of vertices than their neighbors.

An approximation algorithm was proposed for solving the minimum vertex coloring problem based on action sets. The action set algorithm iteratively finds the different possible colorings of the graph. Each iteration of the algorithm is subdivided into several stages. At each stage of the algorithm, a subset of the non-adjacent vertices of the graph is selected on the basis of maximum action set and assigned the same color. This process continues until no vertices remain uncolored.

The proposed algorithm guarantees that the graph can be legally colored at each iteration. Therefore, as the proposed algorithm precedes the number of stages so the required number of colors tends to the chromatic number of the graph. To show the performance of the proposed algorithm we compared it with several vertex coloring algorithms proposed earlier in terms of the round, time and the number of colors required for coloring the graphs.
We compare RNSA, RDSA, ASBA algorithms on the basis of

- Number of communication rounds
- Time taken by the algorithms
- Number of colors used to represent each independent set

Comparisons of performance of three algorithms are shown in figure 6.1. Figure 6.1 presents results of 15 simulation runs taken by three algorithms in terms of communication rounds. Figure 6.1 presents the comparison of rounds taken by RNSA-Max and RDSA-Max and ASBA-Max algorithms for the construction of maximal independent set. From the given figure RNSA-Max and ASBA-Max proves to be better algorithm in terms of communication round with respect to RDSA-Max algorithm

![Comparison of Time by three algorithm](image)

**Figure 6.1 Comparison of rounds three algorithms**
Figure 6.2 presents the comparison of execution time taken by RNSA-Max and RDSA-Max and ASBA-Max algorithms for the construction of maximal independent set. From the given figure RNSA-Max and ASBA-Max proves to be better algorithm in terms of execution time with respect to RDSA-Max algorithm.

Figure 6.2 Time taken by three Algorithms

Figure 6.3 presents the comparison of color taken by RNSA-Max and RDSA-Max and ASBA-Max algorithms for the construction of maximal independent set. From the given figure RNSA-Max and ASBA-Max proves to be better algorithm in terms of execution time with respect to RDSA-Max algorithm. It shows a comparison between the performance of RNSA-Max and RDSA-Max and ASBA-Max algorithms in terms colors required to color with nodes varying from 12 to 500.
Figure 6.3 Comparison of colors used by algorithms

The results obtained from the execution of the algorithms shows the performance of the algorithm. Out of the three algorithms namely RNSA, RDSA and ASBA, which were executed, RNSA and ASBA are found to be better from performance point of view as compared to RDSA. On the basis of this comparison we conclude that action set based algorithm uses fewer than Δ colors as Δ increases. It gives optimized solution in term of construction of independent set. Radio frequency spectrum has high cost and communication cost is very low and we have to save our frequency spectrum for its best utilization, then action set based algorithm provides the best solution.

6.2 FUTURE WORK

A set of three algorithms using distributed approach for allocation of frequency in mobile network have been implemented in the proposed work. The aim is to reuse the frequency allocated in mobile networks.

1. The time required to send and receive messages between different nodes in a modelled graph will be targeted for efficient resource utilization.
2. The proposed algorithms will be tested for the complete graph of higher connectivity.
3. Implementation of dynamic channel allocation at runtime using the distributed approach with action set based approach.