CHAPTER 7

CONCLUSION AND FUTURE SCOPE

7.1 Conclusion

3D surface generation is the process to form the regular or irregular structures, objects and surfaces. To understand the basic architecture of the object, it is required to process the basic construction of these objects. This construction can be observed to remove the structural impurities as well as can be applied in the application specific process or scenario. This work is focused on the construction of 3D surface from the random points and connectivity. A series of rules are applied to identify the impurities in the surface construction. The cost optimization method is applied to transform the 3D surface to 2D. Finally, this transformed surface is colorized under graph coloring constraints.

The provided work is structured as a 3D stage framework. The framework accepted the random 3D points as the input. In the first stage of this framework, the 3D surface is generated along with impurities rectification. The rules are applied to identify the problem such as hidden lines, hidden edges, hidden edges, etc. In the second stage of this framework, the rectified 3D surface is processed under genetic algorithm to transform the surface to 2D structure. At the final stage, the BFO algorithm is applied over transformed 2D surface to colorize the graph structure.

The provided framework is implemented for different configuration in terms of the space environment and the optimization algorithm. The results are taken in terms of cost optimization and processing time observations. The results signify that the method is robust and ensure the work solution. The comparative results of graph coloring are taken against the greedy algorithm. The implementation results show that the proposed method has provided for effective colorization and reduced the number of colors used.
7.2 Summary

The framework is provided to generate a 3D surface from random points and to apply the transformation over it. In the final stage, the node coloring is applied on obtained transformed surface. The summary of work done is listed below:

- A three stage framework is provided that processed the random 3D points and applied a series of operation in connecting layers to color the structure at the node level.

- The mathematical formulation is applied to resolve the common impurities in 3D construction, including hidden lines, hidden points, hidden edges etc.

- The rule specific and cost optimized genetic optimization method is applied to reform the surface.

- The experimentation tested on 105 different combinations of genetic parameters to select the most effective genetic configuration.

- The genetic model is applied with cost optimization and fixed iteration condition.

- The BFO algorithm is applied to color the generated structure at the node level.

- A user friendly configuration and robust interface is designed to apply the defined framework.

- The observations are taken for different configuration in terms of number of nodes in the structure and the number of optimization iterations processed.

- The graphical results are provided to present the work undertakings in an effective form.

- The comparative results are provided for the work validation, for this the generated result of BFO graph coloring are compared with greedy method.
In the best case we have achieved 40% savings in number of colors used for a graph, means the optimization varies from 0 to 40% as number of node increases in the graph.

### 7.3 Future Scope

The work is provided as a three-stage framework for a 3D surface generation, 2D transformation and node level colorization. The work has integrated the mathematical formulation, genetic and BFO in different stages of this framework. The comparative results against greedy algorithm validate the work effectiveness. The work can be extended in future under following aspects:

- The impurities are identified for hidden lines, overlapped points, overlapped edges and collinear points. In future, the work can be applied for identification of some other impurities types.

- The genetic is considered as the cost optimization function in transformation stage, in the future some other light weight optimization algorithm can be applied such as differential evolution.

- The BFO is applied in the final stage to colorize the graph, which can be extended in future to more adaptive approach such as BCO (Bee Colony Optimization).

- The mathematical derivation for finding the time complexity can be done.

- Experiment have done on random graphs. The same algorithm can be tested for different types of graph classes.

***❖❖❖***