CHAPTER 7

CONCLUSION

7.1 OUTCOME OF THIS RESEARCH WORK

This thesis has focussed on CF problems that arise in CMS. In this work, three ANN approaches are developed for MPIM CF, multi objective CF, FCF and CF with considering production factors.

The modified procedure of neural networks has been successfully implemented for CF problems. This modified ANN approaches are applied to the two hundred and twelve benchmark data sets, which are found in the literature and the results are compared to other algorithms in terms of various performance measures.

The modified BP is suitable for multiple objectives. The exceptional elements, intra-cell move, intra-cell machine load unbalance, and inter-cell machine load unbalance are considered as multiple objectives to evaluate the goodness of the CF. More number of constraints can be included in this modified BP CF.

For the MPIM based CF, the different performance measures are compared with the modified ANN. The number of exceptional elements, number of bottleneck machines, number of bottleneck parts, the grouping efficiency, grouping efficacy, grouping measure and grouping capability index are considered as the performance measures to measure the goodness of the CF.

The modified KSOM and the modified ART1 networks are performed equally well. But the modified ART1 consistency is high when compared to the modified KSOM. The modified KSOM and modified ART1 are used for CF and FCF. The modified KSOM and modified ART1 algorithm itself straightaway gives the number of exceptional
elements, bottleneck machines and bottleneck parts. And also the algorithms itself take care of improving grouping efficiency by proper assignment of machines and parts to the GT cells.


The modified KSOM network performs equal to the modified ART1 networks. However, as far as the MPIM is concerned modified BP and modified KSOM algorithm do not perform like ART1 does. The modified ART1 gives better results than modified KSOM algorithm. Modified ANN algorithms give machine cells and part families, but modified KSOM networks give different result for each and every run. And selecting the optimum parameters for KSOM is also problematic. But the modified ART1 gives same result for all the runs with the constant vigilance parameter. The modified ART1 network is suitable for any size of MPIM.

The modified ART1 neural network has been successfully implemented for FCF problems also. The results are compared with popular existing algorithms such as Murthy
and Srinivasan (1995) SAA and HA and found that the modified ART1 solution is superior in most of the cases. The modified ART1 gives the outputs as the list of part families and the corresponding part list, GT cells and their corresponding list of machines, the reminder cell with the corresponding list of machinery and the total number of exceptional elements. The computational effort is very low in the modified ART1 when compared to all other algorithms. This modified ART1 is suitable for any size of MPIM.

Real life large size data sets also tested in the modified ART1 for CF. The results are highly comparable with the most popular algorithms.

This modified ART1 also deals with non-binary data, operation sequences and operation sequence with production volume. These modified approaches are tested with the set of literature problems and compared. The modified ART1 results are best or equal when compared with all other algorithms.

The modified ANN approaches are coded with the C++ and Mat Lab 6.5. The test datasets were tested with the Pentium IV 900 MHz, Systems.

7.2 LIMITATIONS

The modified BP networks computational time is more. The modified KSOM and modified ART1 are focuses which minimize the number of exceptional elements with maximizing grouping efficiency. Constraints can not be imposed in the modified KSOM and modified ART1. Multi objectives are not possible in this modified KSOM and modified ART1. For the large size matrices the modified KSOM network is not suitable.
7.3 SCOPE FOR FUTURE RESEARCH

The other ANN models can be modified for CF and FCF. Several improvements to the modified neural networks are possible for CF. The scope of this modified KSOM and modified ART1 are restricted for the CF with an objective of minimization of exceptional elements and maximization of the grouping efficiency. Some of the issues like more number of constraints, multi-objectives etc. can be implemented in this modified KSOM networks and the modified ART1 neural networks.

The modified BP computational time can be minimized and also for different objectives the large size problems can be solved.

For FCF the problem can be considered including the processing times of the machines and part demand. More than one reminder cell can be considered for the future research of the FCF.