The main objective of this research work is to invent and implement the fast and less memory consumable clustering algorithms in Data Mining. Among the many clustering algorithms, density based clustering algorithms are gained the popularity due to their ability to detect cluster(s) with arbitrary shape and they find the correct number of existing clusters in the dataset without specifying the numbers of clusters as input.

In this thesis, there are four density based clustering algorithms are proposed. Among four, two algorithms are suitable for small size dataset and another two algorithms are capable of handling large size dataset. First, a new algorithm for mining the similar density clusters has been introduced. This algorithm uses the existing and recently proposed density based clustering algorithms techniques as well as some newly proposed techniques to minimize the processing time of neighbour objects computation while expanding the cluster(s). Hence the processing time has been reduced and the experiment results proved that the new algorithm gives similar result of basic density based clustering algorithm with highest performance. Though the computation speed has been increased, this algorithm uses the traditional approach to compute the neighbours. So this algorithm is suitable for handling small dataset.

Followed by the first algorithm, another new algorithm has been proposed that uses the concept of Sparse Memory Mapped File. Using this concept, all the objects are initially loaded into the corresponding memory locations. As the objects are loaded into the right memory locations in the beginning, the neighbour objects
computation become easy. Hence new complexity has been formed as the neighbour computation required visiting only the required number of neighbour cells during the cluster expansion. So it is proved that the new approach is very fast comparably to the old approach and the new approach can handle more than 1 GB of data in a 32 bit Operating System without any object loss. Also one of the main drawbacks of the density based clustering algorithm is instability. i.e. the basic density based clustering algorithms seed queue list can grow dynamically and the size of the seed queue can't be determined before the processing. So, if there is no sufficient main memory to hold the growing seeds, the algorithm will crash during running time. This crash issue has been completely resolved and this algorithm gives the guarantee that all the objects can be processed as long as we are able to load them into memory. So this algorithm is suitable for handling large dataset.

The Third and fourth algorithms mine the dissimilar density clusters. A highly configurable function has been proposed to give the different density range for isolating the clusters which are different in various neighbours and not separated by sparse region. This algorithm uses the previously proposed technique to speed up the neighbour computation process and which gives the better performance result with good quality of output clusters. The fourth algorithm is an extended version of second algorithm to handle dissimilar density clusters. This algorithm has been modified to use the newly proposed configurable function to work with large dataset to mine the dissimilar cluster(s). As like the second algorithm, this algorithm is very fast and suitable for large dataset.
Eventually these newly proposed algorithms are being used to mine the Oil spilled areas from the Remote Sensing Images. The satellite images which are captured by MODIS have been used for the experiment. Initially all the speckle noise are removed from the original images and the newly proposed density based clustering technique has been applied to cluster the oil spilled areas. In the experiment, dissimilar density based clusters give more meaningful clusters than the similar density clustering algorithms.