

## LIST OF FIGURES

Figure 1-1 IDD Service Diagram.....	2
Figure 1-2 Total Cost Toll Fraud 2014 .....	2
Figure 1-3 Previous studies [11] algorithm using Naive Bayesian – KLD.....	5
Figure 1-4 Research Framework.....	5
Figure 1-5 Research algorithm.....	6
Figure 2-1 NBTree Flowchart Algorithm .....	11
Figure 2-2 Example of an NBTree Classifier Structure.....	12
Figure 2-3 Unpruned Decision Tree and Pruned Version Sample.....	13
Figure 2-4 Subtree Repetition and Subtree Replication.....	15
Figure 2-5 Data Correlation .....	23
Figure 2-6 Confusion Matrix .....	25
Figure 2-7 Frames Framework.....	30
Figure 2-8 Service Blocking/Isolation Workflow.....	31
Figure 3-1 Experiment Stages .....	33
Figure 3-2 Data Preparation Stages.....	34
Figure 3-3 Experiment 1 Stages .....	35
Figure 3-4 Experiment 2 Stages .....	36
Figure 3-5 Call Data Collection System .....	37
Figure 4-1 Call Data Collection System .....	44
Figure 4-2 NBC on Matlab .....	49
Figure 4-3 Capture result in hybrid Naive Bayesian – KLD ( Experiment 1 ).....	51
Figure 4-4 NBTree on 60% training data.....	52
Figure 4-5 NBTree on 70% training data.....	52

Figure 4-6 NBTree on 80% training data.....	53
Figure 4-7 Capture result hybrid NBTree – KLD ( Experiment 1 ).....	53
Figure 4-8 Confusion Matrix and Cost Matrix .....	56
Figure 4-9 Capture Result hybrid Naive Bayesian – KLD ( Experiment 2 ).....	59
Figure 4-10 NBTree on 5-fold cross-validation ( k=1 ).....	60
Figure 4-11 NBTree on 5-fold cross-validation ( k=2 ).....	60
Figure 4-12 NBTree on 5-fold cross-validation ( k=3 ).....	61
Figure 4-13 NBTree on 5-fold cross-validation ( k=4 ).....	61
Figure 4-14 NBTree on 5-fold cross-validation ( k=5 ).....	62
Figure 4-15 Capture Result hybrid NBTree – KLD ( Experiment 2 ).....	63
Figure 4-16 Significant Error Classification on K = 1 .....	65
Figure 4-17 Matlab script for SVM Classification process .....	65
Figure 4-18 SVM Classification Result .....	66
Figure 4-19 Previous and proposed method models.....	68