

## TABLE OF CONTENTS

<b>FOREWORD</b>	<b>i</b>
<b>TABLE OF CONTENTS</b>	<b>ii</b>
<b>LIST OF TABLES</b>	<b>iv</b>
<b>LIST OF FIGURES</b>	<b>v</b>
<b>ABSTRACT</b>	<b>viii</b>
<b>INTISARI</b>	<b>ix</b>
<b>I. INTRODUCTION</b>	
1.1 Research Background	1
1.2 Research Problem	4
1.3 Research Scope	4
1.4. Research Objectives	5
1.5 Research Benefits	5
<b>II. LITERATURE REVIEW</b>	<b>6</b>
<b>III. THEORETICAL FRAMEWORK</b>	
3.1 Business Property	11
3.2 Hotel Review	12
3.3 Web Scraping	13
3.4 Semi Supervised Learning	14
3.4.1 Label Propagation	16
3.4.2 Label Spreading	19
3.5 Naïve Bayes Classifier	20
3.6 Confusion Matrix	24
3.6.1 Accuracy	25

3.6.2 Precision	25
3.6.3 Recall	26
3.6.4 F1-Score	26
<b>IV. RESEARCH METHODOLOGY</b>	
4.1 Research Description	27
4.2 Tools and Materials	28
4.3 Data Collection	29
4.4 Data Cleaning & Preprocessing	31
4.5 Data Labeling	34
4.6 Semi Supervised Labeling	36
4.7 Data Evaluation	40
<b>V. IMPLEMENTATION</b>	
5.1 Data Collection	44
5.2 Data Labelling	46
5.3 Data Cleaning & Preprocessing	47
5.4 Bernoulli Naïve Bayes Model	49
5.4.1 Data Exploration to Determine Naïve Bayes Modelling	49
5.4.2 Bernoulli Naïve Bayes Modelling on Labelled Dataset	51
5.4.3 Bernoulli Naïve Bayes Pseudo-Labeling on Unlabelled Dataset	55
5.4.4 Bernoulli Naïve Bayes on Combined Dataset	58
5.5 Label Propagation Model	60
5.5.1 Label Propagation Modelling on Labelled Dataset	60
5.5.2 Label Propagation Pseudo-Labeling on Unlabelled Dataset	63
5.5.3 Label Propagation on Combined Dataset	67
5.6 Label Spreading Model	70

5.6.1 Label Spreading Modelling on Labelled Dataset	70
5.6.2 Label Spreading Pseudo-Labeling on Unlabelled Dataset	74
5.6.3 Label Spreading on Combined Dataset	77
5.7 Bernoulli Naïve Bayes with Semi Supervised Learning Model	79
5.4.1 Bernoulli Naïve Bayes Modelling on Labelled Dataset	80
5.4.2 Label Propagation Approach on Unlabelled Dataset	80
5.4.3 Label Spreading Approach on Unlabelled Dataset	83
5.4.4 Semi-Supervised Learning Approach on Combined Dataset	87
<b>VI. RESULTS AND DISCUSSION</b>	
6.1 Results	88
6.2 Discussion	92
<b>VII. CONCLUSION</b>	
7.1 Conclusion	111
7.2 Future Works	111