

Contents

ACKNOWLEDGEMENTS	V
ABSTRACT	VII
CONTENTS	IX
LIST OF FIGURES.....	XII
LIST OF TABLES	XIV
CHAPTER 1: INTRODUCTION TO TEXT SUMMARIZATION.....	1
1.1 INTRODUCTION	1
1.2 DATA MINING	2
1.3 TEXT MINING.....	5
1.4 MOTIVATION FOR TEXT SUMMARIZATION.....	8
1.5 PROBLEM STATEMENT AND OBJECTIVES.....	9
1.5.1 <i>Problem Statement</i>	9
1.5.2 <i>Objectives</i>	9
1.6 THE RESEARCH CONTRIBUTION	9
1.7 LAYOUT OF THE THESIS.....	10
CHAPTER 2: LITERATURE SURVEY	12
2.1 HISTORY OF SUMMARIZATION	12
2.2 A DEEPER LOOK INTO SUMMARIZATION.....	13
2.3 THE INPUT SOURCE	14
2.3.1 <i>Single Document Text Summarization</i>	14
2.3.2 <i>Multi-Document Text Summarization</i>	15
2.4 SUMMARIZATION APPROACHES	15
2.4.1 <i>Text Summarization with Supervised Approaches</i>	15
2.4.2 <i>Classification in Text Summarization</i>	17
2.4.3 <i>Regression in Text Summarization</i>	18
2.4.4 <i>Text Summarization with Unsupervised Approaches</i>	20
2.4.5 <i>Cluster-Based Methods</i>	20
2.4.6 <i>Term Frequency Based Methods</i>	21
2.4.7 <i>Latent Semantic Analysis Methods</i>	22
2.4.8 <i>Graph-Based Methods</i>	23
2.4.9 <i>Text Summarization with Natural Language Processing</i>	25
2.4.10 <i>Deep Learning in Text Summarization</i>	26
CHAPTER 3: TEXT PRE-PROCESSING.....	29
3.1 INTRODUCTION	29
3.2 MORPHOLOGICAL ANALYSIS	29
3.3 TOKENIZATION.....	30

3.4 FILTERING	30
3.5 STEMMING	31
3.5.1 <i>Introduction to Stemming</i>	31
3.5.2 <i>Stemming and Lemmatizing</i>	33
3.6 SYNTACTICAL AND SEMANTICAL ANALYSIS.....	35
3.6.1 <i>Syntactical Analysis</i>	35
3.6.2 <i>Semantical Analysis</i>	35
3.7.2 <i>Term Frequency</i>	37
3.7.4 <i>Length Normalization</i>	40
3.8 ATTRIBUTE SELECTION.....	41
3.8.1 <i>Introduction</i>	41
3.8.2 <i>Comparison of Attribute Selection Methods</i>	41
CHAPTER 4: LATENT SEMANTIC ANALYSIS.....	46
4.1. INTRODUCTION	46
4.2. INPUT MATRIX GENERATION	48
4.2.1. <i>Tokenization</i>	48
4.2.2. <i>Stop Words Removal</i>	48
4.2.3. <i>Stemming</i>	49
4.2.4. <i>Term Frequency</i>	49
4.2.5. <i>Weighting Cell Values</i>	49
4.3. SINGULAR VALUE DECOMPOSITION (SVD).....	50
4.4. THE APPROACH TO SENTENCE SELECTION.....	52
4.4.1. <i>Gong and Liu Approach to Sentence selection (2011)</i>	52
4.4.2. <i>Steinberger and Jezek (2004)</i>	53
4.4.3. <i>Murray, Renals, and Carletta (2005)</i>	54
4.4.4. <i>Cross Method</i>	55
4.4.5. <i>Topic Method</i>	56
4.5. LIMITATIONS OF LSA.....	58
CHAPTER 5: TEXT SUMMARIZATION WITH NAÏVE BAYES	60
5.1 INTRODUCTION	60
5.2 CLASSIFICATION IN MACHINE LEARNING.....	61
5.2.1 <i>Classification - Text Handling</i>	63
5.2.2 <i>Classifying Summary Sentences</i>	63
5.3 THE NAÏVE BAYES CLASSIFIER.....	64
5.3.1 <i>The Bayes Theorem</i>	64
5.3.2 <i>The Multinomial Model</i>	66
5.3.3 <i>The Bernoulli Model</i>	68
5.3.4 <i>Comparison of the Multinomial and Bernoulli Models</i>	69
5.4 THE PROPOSED MODEL	70
5.4.1 <i>The Dataset description</i>	70
5.4.2 <i>Pre-processing the Data</i>	71
5.4.3 <i>Feature Extraction</i>	72

<i>5.4.4 Latent Semantic Analysis.....</i>	73
<i>5.4.5 Threshold Generation</i>	73
5.5 RECURSIVE FEATURE ELIMINATION	73
5.6 CLASSIFICATION USING NAÏVE BAYES	75
5.7 MODEL EVALUATION	75
<i>5.7.1 The Evaluation Measures</i>	76
5.8 EXPERIMENTAL RESULTS	81
<i>5.8.1 Visualization of Training and Testing Data</i>	84
CHAPTER 6: A HYBRID APPROACH TO TEXT SUMMARIZATION	88
6.1 INTRODUCTION	88
6.2 AN INSIGHT INTO DEEP LEARNING	89
6.3 THE PROPOSED MODEL	92
<i>6.3.1 Pre-processing the Data</i>	95
<i>6.3.2 Feature Extraction</i>	95
<i>6.3.3 Latent Semantic Analysis.....</i>	96
<i>6.3.4 Threshold Generation</i>	96
6.4 SELF-ORGANIZING MAPS (SOM)	96
<i>6.4.1 SOM Based Text Summarization.....</i>	99
<i>6.4.2 SOM Visualization</i>	100
6.5 MAPPING OF INPUT AND OUTPUT	100
6.6 INTRODUCTION TO DEEP NEURAL NETWORK.....	101
<i>6.6.1 The Architecture of Deep Neural Network</i>	103
<i>6.6.2 Neural Network Learning</i>	104
<i>6.6.3 Gradient Descent.....</i>	106
<i>6.6.4 Activation Function</i>	110
6.7 EXPERIMENTAL SETUP AND RESULT ANALYSIS.....	115
<i>6.7.1 Dataset Description</i>	115
<i>6.7.2 Result Analysis</i>	117
CHAPTER – 7 CONCLUSION AND FUTURE WORK	129
APPENDIX A.....	132
APPENDIX B.....	138
PUBLICATIONS	141
BIBLIOGRAPHY.....	143