

TABLE OF CONTENTS

COVER	i
APPROVAL PAGE	ii
STATEMENT	iii
PREFACE	v
TABLE OF CONTENTS	vi
TABLE OF FIGURES	ix
TABLE OF TABLES	xi
TABLE OF EQUATIONS	xii
ABSTRACT	1
CHAPTER I: INTRODUCTION	2
1. 1 Research Background	2
1. 2 Research Problem	3
1. 3 Research Scope	3
1. 4 Research Objective	4
1. 5 Research Advantage	4
CHAPTER II: LITERATURE REVIEW	5
CHAPTER III: THEORETICAL BASIS	13
3. 1 Quran Recitation Styles	13
3. 2 Mel Frequency Cepstral Coefficient (MFCC)	13
3. 3 Log Mel Filter Bank	15
3. 4 Spectral Subband Centroids (SSC)	15
3. 5 Artificial Neural Network (ANN)	16
3. 6 Activation Function	17
3. 6. 1 Rectified Linear Unit (ReLU)	17
3. 6. 2 Softmax	18
3. 7 Convolutional Neural Network (CNN)	19
3. 7. 1 Convolution Layer	19
3. 7. 2 Max Pooling Layer	20
3. 7. 3 Fully Connected Layer	21



3. 7. 4 Dropout Layer	21
3. 8 Long Short-Term Memory (LSTM)	22
3. 9 Categorical Cross Entropy Loss Function	23
3. 10 Adaptive Moment Estimation (Adam) Optimizer	23
3. 11 Evaluation Metrics	24
CHAPTER IV: RESEARCH METHODOLOGY	26
4. 1 Literature Study	26
4. 2 Data Acquisition	26
4. 3 Feature Extraction	27
4. 4 Deep Learning Model	28
4. 5 Model Evaluation	29
4. 6 Research Workflow Summary	30
CHAPTER V: IMPLEMENTATION	32
5. 1 Hardware and Software Specifications	32
5. 2 Systems Implementation	32
5. 2. 1 Data Collection	33
5. 2. 2 Data Loading	33
5. 2. 3 Sample Generation	34
5. 2. 4 Feature Extraction	35
5. 2. 5 Train/Test Split	37
5. 2. 6 Model Training	37
5. 2. 7 Model Evaluation	40
CHAPTER VI: RESULT AND DISCUSSION	42
6. 1 Optimal Parameter Selection	42
6. 1. 1 Feature Extraction	44
6. 1. 2 Normalization Methods	44
6. 1. 3 Convolution Layer Parameters	47
6. 1. 4 Pooling Layer	49
6. 1. 5 Activation Functions on Dense Layers	51
6. 1. 6 Length of Samples	52



6. 1. 7 Dropout Layers	53
6. 1. 8 Number of Epochs	54
6. 2 Model Evaluation on Test Data with Optimum Parameters	56
6. 3 Comparison with Other Neural Network Architecture	58
CHAPTER VII: CONCLUSION AND SUGGESTION	61
7. 1 Conclusions	61
7. 2 Suggestions	62
REFERENCES	63