

Table of Contents

1	Chapter 1.....	15
1.1	Introduction	15
1.1.1	Air Pollution impacts	15
1.1.2	Air Pollution and Climate Change	16
1.1.3	Climate Change and PM2.5: An Inextricable Link	19
1.1.4	Co-Benefits of PM2.5 Reduction Strategies and Climate Mitigation....	22
1.1.5	Modeling Studies	25
1.2	Literature Review	26
1.2.1	Deterministic Models:.....	26
1.2.2	Statistical models	27
1.2.3	Artificial Neural Network (ANN):.....	27
1.2.4	Deep Learning Models:.....	28
1.2.5	Objectives	30
2	Chapter 2.....	32
2.1	Methodology	32
2.1.1	Site and Data Description	32
2.1.2	Data Pre-processing	39
2.1.3	Sequence to sequence modeling	41
2.1.4	Recurrent Neural Network (RNN).....	42
2.1.5	Long Short-Term Memory (LSTM)	43
2.1.6	Bidirectional-LSTM (BLSTM).....	44
2.1.7	Three Dimensional Convolutional Neural Network (3D CNN)	45
2.1.8	Convolutional LSTM (ConvLSTM)	45
2.1.9	Bi-Convolutional LSTM (BConvLSTM)	46
3	Chapter 3.....	49
3.1	Model Development.....	49
3.1.1	Network Architecture.....	49
3.1.2	Overlapping Moving Window	55
3.1.3	Hyperparameters.....	56
3.1.4	Model Evaluation.....	59
4	Chapter 4.....	61
4.1	Results and Discussions	61

4.1.1	Statistical Distribution Analysis (Objective 1)	61
4.1.2	Seasonal Autoregressive Integrated Moving Average with Exogenous Factors (SARIMAX)	71
4.1.3	Comparative study of encoder-decoder based deep learning models (Objective 3):.....	74
4.1.4	Proposed Model and performance evaluation (Objective 2):	78
4.1.5	Model Performance in terms of Data length and SNR values	89
4.1.6	Index of Agreement	93
4.1.7	Seasonal Wind effect :	98
4.1.8	Comparison with Other Studies	103
5	Conclusion	105
5.1	List of Publications.....	106
6	References:	107
7	Appendix	125
7.1	Line plot of input data	Error! Bookmark not defined.