

CONTENTS

Approval Page	iv
Preface	iii
Abstract	x
I INTRODUCTION	1
1.1 Research Background	1
1.2 Research Problem	2
1.3 Research Scope	3
1.4 Research Objective.....	3
1.5 Research Benefit	4
II LITERATURE REVIEW	5
III BASIC THEORY	13

3.1	Crop Productivity	13
3.2	Corn Growth	13
3.3	Maize Cultivation in East Java.....	15
3.4	Precipitation and Yield.....	16
3.5	Temperature and Yield.....	16
3.6	Artificial Neural Network	17
3.7	Multi Layer Perceptron	17
3.8	Stochastic Gradient Descent	18
3.9	Stochastic Gradient Descent with Momentum.....	19
3.10	AdaGrad	19
3.11	RMSprop.....	20
3.12	Adam	21
3.13	Rectified Linear Unit	22
3.14	Leaky Rectified Linear Unit.....	23
3.15	Min Max Normalization.....	24
3.16	Root Mean Squared Error	24
3.17	Root Mean Squared Error Skill Score.....	25
IV	RESEARCH METHODOLOGY	26
4.1	Research Description	26
4.2	Research Phases	26
4.3	Data Acquisition	27
4.4	Dataset.....	27
4.5	Data Preprocessing.....	28
4.6	Selecting Predictors.....	29
4.7	Multi Layer Perceptron Model.....	30
4.8	Model Training and Experimentation	32
4.9	Development Environment	33
4.10	Evaluation	33
V	IMPLEMENTATION	35

5.1	Codebase	35
5.2	Programming Paradigm and Tooling	35
5.3	Data Format.....	35
5.4	Preprocessing	37
5.5	Aggregation.....	38
5.6	Building the Test and Training Dataset	41
5.7	Normalizing the Data	41
5.8	Building the Model	42
5.9	Training the Model.....	43
VI	RESULTS AND DISCUSSION	44
VII	CONCLUSION	50
7.0.1.	Future Works.....	51
	References	52
VIII	FULL IMPLEMENTATION	56