

DAFTAR ISI

HALAMAN JUDUL.....	i
HALAMAN PENGESAHAN I	ii
HALAMAN PENGESAHAN II.....	iii
KATA PENGANTAR	iv
ABSTRAK	v
ABSTRACT.....	vi
DAFTAR ISI.....	vii
DAFTAR TABEL.....	x
DAFTAR GAMBAR	xi
LAMPIRAN.....	xii
BAB I PENDAHULUAN.....	1
1.1 Latar Belakang.....	1
1.2 Rumusan Masalah	4
1.3 Batasan Masalah.....	5
1.4 Tujuan Penelitian.....	5
BAB II TINJAUAN PUSTAKA.....	6
2.1 Pasar Modal	6
2.2 Saham PT Telkom Indonesia.....	6
2.3 Analisis Runtun Waktu.....	7
2.4 <i>Data Preprocessing</i>	13
2.4.1 <i>Missing Values</i>	13
2.4.2 Deteksi <i>Outlier</i>	14
2.4.3 Normalisasi Data.....	14
2.5 <i>Artificial Neural Network (ANN)</i>	16
2.5.1 Fungsi <i>Sigmoid</i>	17
2.5.2 Fungsi Tanh	18
2.5.3 Fungsi ReLu.....	19
2.6 <i>Recurrent Neural Network (RNN)</i>	20
2.7 <i>Long Short-Term Memory (LSTM)</i>	23
2.7.1 <i>Forget Gate</i>	24

2.7.2	<i>Input Gate</i>	24
2.7.3	<i>Output Gate</i>	25
2.7.4	<i>Cell State</i>	26
2.7.5	<i>Hidden State</i>	27
2.7.6	<i>Forward dan Backpropagation</i>	28
2.7.7	<i>Hyperparameter Long Short-Term Memory (LSTM)</i>	35
2.7.8	<i>Adam Optimizer</i>	37
2.8	<i>Particle Swarm Optimization (PSO)</i>	39
2.8.1	<i>Algoritma Particle Swarm Optimization (PSO)</i>	39
2.8.2	<i>Implementasi LSTM – PSO</i>	42
2.9	<i>Mean Absolute Percentage Error (MAPE)</i>	45
BAB III METODE PENELITIAN.....		47
3.1	<i>Jenis dan Sumber Data</i>	47
3.2	<i>Variabel Penelitian</i>	47
3.3	<i>Tahapan Analisis Data</i>	47
3.4	<i>Diagram Alir</i>	49
BAB IV HASIL DAN PEMBAHASAN		51
4.1	<i>Deskripsi Data</i>	51
4.2	<i>Preprocessing</i>	52
4.2.1	<i>Normalisasi Data</i>	53
4.2.2	<i>Membuat Lagged Data Set</i>	53
4.2.3	<i>Pembagian Data Training dan Data Testing</i>	54
4.3	<i>Pembentukan Model Long Short-Term Memory Awal</i>	55
4.3.1	<i>Arsitektur Model Long Short-Term Memory Awal</i>	55
4.3.2	<i>Perhitungan Manual Long Short-Term Memory</i>	55
4.3.3	<i>Menentukan Nilai Hyperparameter</i>	66
4.3.4	<i>Training awal Baseline Long Short-Term Memory</i>	67
4.4	<i>Optimasi Hyperparameter Particle Swarm Optimization (PSO)</i>	69
4.4.1	<i>Hyperparameter Long Short-Term Memory</i>	69
4.4.2	<i>Konfigurasi Particle Swarm Optimization (PSO)</i>	70
4.4.3	<i>Training LSTM-PSO</i>	71
4.5	<i>Hasil LSTM-PSO</i>	75

4.6 Evaluasi Kinerja Model.....	77
4.7 Penentuan Model Terbaik Berdasarkan Perbandingan Kinerja.....	78
4.8 Prediksi Periode Mendatang.....	80
4.9 <i>Deployment</i> Menggunakan <i>Streamlit</i>	81
BAB V PENUTUP.....	85
5.1 Kesimpulan.....	85
5.2 Saran	86
DAFTAR PUSTAKA	87
LAMPIRAN.....	90