

DAFTAR ISI

HALAMAN JUDUL.....	i
HALAMAN PENGESAHAN.....	ii
PERNYATAAN BEBAS PLAGIASI	iii
HALAMAN PERSEMBAHAN	iv
PRAKATA.....	v
DAFTAR ISI.....	vii
DAFTAR TABEL.....	xi
DAFTAR GAMBAR	xiii
DAFTAR LAMPIRAN	xv
INTISARI.....	xvii
ABSTRACT.....	xviii
BAB I PENDAHULUAN.....	1
1.1 Latar Belakang	1
1.2 Rumusan Masalah	5
1.3 Batasan Masalah.....	5
1.4 Tujuan Penelitian.....	6
1.5 Manfaat Penelitian.....	7
1.6 Tinjauan Pustaka	7
1.7 Metodologi Penelitian	11
1.8 Sistematika Penulisan.....	11
BAB II LANDASAN TEORI	13
2.1 Konsep Regresi.....	13
2.2 Runtun Waktu.....	15
2.2.1 Konsep Runtun Waktu	15
2.2.2 Proses Stokastik	16
2.2.3 Proses <i>Wide-Sense</i> (W-S) Stasioner.....	16
2.3 Pola Data Runtun Waktu	17
2.4 Uji Stasioneritas	17
2.5 Model Runtun Waktu	18

2.5.1	Proses <i>White Noise</i>	18
2.5.2	Proses <i>Autoregressive</i> (AR)	19
2.5.3	Proses <i>Moving Average</i> (MA).....	20
2.5.4	Proses <i>Autoregressive Moving Average</i> (ARMA)	20
2.5.5	Model <i>Autoregressive Integrated Moving Average</i> (ARIMA)	21
2.5.6	Model <i>Autoregressive Integrated Moving Average with Exogenous Variable</i> (ARIMAX).....	22
2.6	Fungsi Autokorelasi Parsial (PACF)	22
2.7	Uji <i>Lagrange Multiplier</i> (LM)	24
2.8	<i>Hadamard Product</i>	25
2.9	<i>Data Mining</i>	26
2.10	<i>Machine Learning</i>	27
2.10.1	Metode <i>Machine Learning</i>	27
2.10.2	<i>Data Splitting</i>	28
2.10.3	<i>Underfitting</i> dan <i>Overfitting</i>	29
2.11	<i>High Dimensional Data</i>	30
2.12	<i>Feature Selection</i>	31
2.12.1	Konsep <i>Feature Selection</i>	31
2.12.2	Jenis-jenis <i>Feature Selection</i>	32
2.13	<i>Decision Tree</i>	33
2.14	<i>Ensemble Learning</i>	34
2.15	<i>Cross Validation</i>	36
2.16	<i>Deep Learning</i>	38
2.17	<i>Artificial Neural Network</i>	38
2.18	Fungsi Aktivasi	40
2.18.1	<i>Hyperbolic Tangent</i> (tanh)	41
2.18.2	<i>Rectified Linear Unit</i> (ReLU)	41
2.18.3	Sigmoid	42
2.19	<i>Hyperparameter</i>	43
2.20	<i>Gradient Descent</i>	44
2.21	<i>Adaptive Moment Estimation</i> (Adam)	45

2.22	<i>Min-Max Normalization</i>	46
2.23	<i>Evaluation Metrics</i>	46
2.24	Saham	47
BAB III METODE EXTREME GRADIENT BOOSTING DAN LONG SHORT-TERM MEMORY		49
3.1	<i>Extreme Gradient Boosting (XGBoost)</i>	49
3.2	<i>Feature Selection Berbasis Extreme Gradient Boosting (XGBoost)</i>	51
3.2.1	<i>Algoritma Feature Selection Berbasis Extreme Gradient Boosting</i>	52
3.3	<i>Recurrent Neural Network (RNN)</i>	53
3.3.1	<i>Jenis-jenis Recurrent Neural Network</i>	55
3.3.2	<i>Keunggulan dan Kelemahan Recurrent Neural Network</i>	58
3.4	<i>Long Short-Term Memory (LSTM)</i>	59
3.4.1	<i>Struktur Long Short-Term Memory</i>	60
3.4.2	<i>Algoritma Long Short-Term Memory</i>	65
3.5	<i>Algoritma Feature Selection Berbasis Extreme Gradient Boosting dan Long Short-Term Memory (XGBoost-LSTM)</i>	66
3.5.1	<i>Prediksi Harga Saham dengan Algoritma XGBoost-LSTM</i>	68
BAB IV STUDI KASUS		70
4.1	<i>Deskripsi Data</i>	70
4.2	<i>Data Preprocessing</i>	71
4.3	<i>Data Splitting</i>	72
4.4	<i>Pemodelan Runtun Waktu dengan Metode ARIMAX</i>	72
4.5	<i>Normalisasi Data</i>	79
4.6	<i>Series to Supervised</i>	79
4.7	<i>Pemodelan Runtun Waktu dengan Metode LSTM</i>	80
4.7.1	<i>Model LSTM dengan fungsi aktivasi tanh</i>	80
4.7.2	<i>Model LSTM dengan fungsi aktivasi ReLU</i>	81
4.7.3	<i>Model LSTM dengan fungsi aktivasi sigmoid</i>	83
4.7.4	<i>Model LSTM terbaik</i>	84
4.8	<i>Pemodelan Runtun Waktu dengan Metode XGBoost-LSTM</i>	86
4.8.1	<i>Feature importance</i>	86

4.8.2	Model XGBoost-LSTM dengan fungsi aktivasi tanh	88
4.8.3	Model XGBoost-LSTM dengan fungsi aktivasi ReLU	90
4.8.4	Model XGBoost-LSTM dengan fungsi aktivasi sigmoid	92
4.8.5	Model XGBoost-LSTM terbaik	94
4.9	Pemodelan Runtun Waktu Terbaik untuk Prediksi Harga Saham.....	97
BAB V PENUTUP.....		100
5.1	Kesimpulan.....	100
5.2	Saran	101
DAFTAR PUSTAKA		102
LAMPIRAN		107