

DAFTAR ISI

HALAMAN PENGESAHAN	ii
PERNYATAAN BEBAS PLAGIASI	iii
PRAKATA	iv
ARTI LAMBANG DAN SINGKATAN	vi
ABSTRACT	vii
INTISARI	viii
DAFTAR ISI.....	ix
DAFTAR GAMBAR	xii
DAFTAR TABEL	xiv
BAB I PENDAHULUAN.....	1
1.1 Latar Belakang	1
1.2 Perumusan Masalah	3
1.3 Tujuan Penelitian.....	3
1.4 Batasan Penelitian	3
1.5 Manfaat Penelitian	4
1.6 Keaslian Penelitian.....	4
1.7 Sistematika Penulisan.....	10
BAB II TINJAUAN PUSTAKA DAN LANDASAN TEORI	11
2.1 Tinjauan Pustaka	11
2.2 Landasan Teori	24
2.2.1 Tanah Longsor	24
2.2.2 Peta Kerawanan Bencana Tanah Longsor.....	25
2.2.3 Data Inventaris Tanah Longsor	25
2.2.3.1 <i>Flow Direction</i>	26
2.2.3.2 <i>Aspect</i>	26
2.2.3.3 <i>Curvature</i>	26
2.2.3.4 <i>Density Fault</i>	26
2.2.3.5 <i>Density Lineament</i>	26
2.2.3.6 <i>Density River</i>	27
2.2.3.7 <i>Density Road</i>	27
2.2.3.8 <i>Distance to Fault</i>	27
2.2.3.9 <i>Distance to Lineament</i>	27
2.2.3.10 <i>Distance to River</i>	27
2.2.3.11 <i>Distance to Road</i>	27
2.2.3.12 <i>Elevation</i>	27
2.2.3.13 <i>Landuse</i>	28
2.2.3.14 <i>Lithology</i>	28
2.2.3.15 <i>Morphology</i>	28
2.2.3.16 <i>Normalized Difference Vegetation Index (NDVI)</i>	28
2.2.3.17 <i>Plan Curvature</i>	28
2.2.3.18 <i>Profile Curvature</i>	28
2.2.3.19 <i>Rainfall</i>	28
2.2.3.20 <i>Relative Relief</i>	29
2.2.3.21 <i>Slope Percentage</i>	29
2.2.3.22 <i>Stream Power Index (SPI)</i>	29
2.2.3.23 <i>Topographic Position Index (TPI)</i>	29
2.2.3.24 <i>Terrain Ruggedness Index (TRI)</i>	29
2.2.3.25 <i>Topographic Wetness Index (TWI)</i>	29

2.2.4	<i>Pre-processing Data</i>	30
2.2.4.1	<i>Removing Missing Value</i>	30
2.2.4.2	<i>One-hot Encoding</i>	30
2.2.5	<i>Mutual Information</i>	30
2.2.6	<i>K-Nearest Neighbor (KNN)</i>	33
2.2.6.1	<i>Euclidean Distance</i>	34
2.2.6.2	<i>Manhattan Distance</i>	34
2.2.6.3	<i>Chebyshev Distance</i>	35
2.2.6.4	<i>Cosine Distance</i>	36
2.2.7	<i>Ensemble Learning</i>	37
2.2.7.1	<i>Voting Classifier</i>	38
2.2.8	<i>Evaluation Matrix</i>	39
2.2.8.1	<i>Confusion Matrix</i>	39
2.2.8.2	<i>Weighted Precision</i>	39
2.2.8.3	<i>Weighted Recall</i>	40
2.2.8.4	<i>Weighted F1-score</i>	40
2.2.8.5	<i>Balanced Accuracy</i>	41
2.3	<i>Hipotesis</i>	41
BAB III METODOLOGI		42
3.1	<i>Alat dan Bahan</i>	42
3.1.1	<i>Alat</i>	42
3.1.2	<i>Bahan</i>	42
3.1.3	<i>JupyterLab</i>	43
3.1.4	<i>Google Earth Pro</i>	43
3.1.5	<i>ArcGIS</i>	43
3.2	<i>Jalannya Penelitian</i>	44
3.2.1	<i>Studi Literatur</i>	44
3.2.2	<i>Pengambilan Data</i>	44
3.2.3	<i>Implementasi</i>	45
3.2.4	<i>Evaluasi Model</i>	45
3.2.5	<i>Pembuatan Peta Kerawanan Bencana Tanah Longsor</i>	45
3.2.6	<i>Pengambilan Kesimpulan dan Pembuatan Laporan</i>	45
3.3	<i>Perancangan Sistem</i>	45
3.3.1	<i>Dataset</i>	46
3.3.2	<i>Preprocessing</i>	50
3.3.3	<i>Feature Selection</i>	50
3.3.4	<i>One-hot Encoding</i>	52
3.3.5	<i>Proses Pelatihan dan Validasi</i>	52
3.3.6	<i>Proses Pengujian dan Evaluasi</i>	57
3.3.7	<i>Pembuatan Peta Kerawanan Bencana Tanah Longsor</i>	59
3.4	<i>Cara Analisis</i>	60
BAB IV HASIL DAN PEMBAHASAN		61
4.1	<i>Dataset</i>	61
4.2	<i>Hasil Preprocessing</i>	67
4.3	<i>Penerapan Mutual Information</i>	68
4.4	<i>Penerapan One-hot Encoding</i>	69
4.5	<i>Hasil</i>	72
4.5.1	<i>Hasil Pelatihan dan Validasi</i>	72
4.5.2	<i>Hasil Pengujian dan Evaluasi</i>	75
4.5.3	<i>Perbandingan Kinerja Dengan Algoritma Ensemble KNN Lain</i>	79

4.5.4	Perbandingan Kinerja Dengan Algoritma KNN Individu.....	80
4.7	Hasil Peta Kerawanan Bencana tanah Longsor	83
BAB V KESIMPULAN DAN SARAN		85
5.1	Kesimpulan	85
5.2	Saran.....	85
DAFTAR PUSTAKA.....		86
LAMPIRAN		L-1
L.1	Gambar Algoritma.....	L-1