

## DAFTAR GAMBAR

Gambar 3. 1 Tahapan bagan umum penelitian.....	22
Gambar 3. 2 Proses Scrapping Data.....	24
Gambar 3. 3 Proses Pre-processing Data Ulasan Aplikasi DANA.....	25
Gambar 3. 4 Algoritma Case Folding.....	26
Gambar 3. 5 Algoritma Data Cleaning.....	27
Gambar 3. 6 Algoritma Tokenizing.....	28
Gambar 3. 7 Algoritma Stopwords.....	30
Gambar 3. 8 Algoritma Steaming.....	31
Gambar 3. 9 Algoritma Normalizing.....	32
Gambar 3. 10 Tahapan Labelisasi.....	33
Gambar 3. 11 Hasil Visuliasasi Diagram Pie.....	39
Gambar 3. 12 Hasil Visualisasi Diagram Batang.....	40
Gambar 3. 13 Hasil Visualisasi Word Cloud.....	40
Gambar 4. 1 Aplikasi Dana Pada Google Play Store.....	41
Gambar 4. 2 Ulasan Pada Aplikasi Dana pada Goole Play Store.....	41
Gambar 4. 3 Statement Proses Scrapping.....	42
Gambar 4. 4 Hasil Scrapping.....	43
Gambar 4. 5 Statement Proses Case Folding.....	43
Gambar 4. 6 Hasil Case Folding.....	44
Gambar 4. 7 Statement Data Cleaning.....	45
Gambar 4. 8 Hasil Data Cleaning.....	45
Gambar 4. 9 Statement Proses Tokenizing.....	46
Gambar 4. 10 Hasil Tokenizing.....	47
Gambar 4. 11 Statement Proses stopword removal.....	47
Gambar 4. 12 Hasil Stopwrord Removal.....	48
Gambar 4. 13 Statement Proses Normalizing.....	48

Gambar 4. 14 Statement Hasil Normalizing .....	49
Gambar 4. 15 Statement Proses Stemming .....	49
Gambar 4. 16 Hasil stemming.....	50
Gambar 4. 17Hasil Labelisasi .....	51
Gambar 4. 18 Statement Proses Data split.....	52
Gambar 4. 19 Statement Proses Klasifikasi sentimen BERT .....	52
Gambar 4. 20Statement Import splitting dataset.....	53
Gambar 4. 21 Statement Import Arsitektur IndoNLU .....	54
Gambar 4. 22 Statement Proses pengecekan device .....	55
Gambar 4. 23 Statement Pengujian Sistem Terhadap Contoh Keluhan Pengguna....	56
Gambar 4. 24 Statement Pengujian beberapa kalimat ulasan .....	57
Gambar 4. 25 Hasil klasifikasi dari beberapa kalimat keluhan negative .....	58
Gambar 4. 26 Statement Fine-tuning IndoBERT.....	59
Gambar 4. 27 Pemilihan optimizer .....	60
Gambar 4. 28 Statement Menentukan jumlah epoch .....	60
Gambar 4. 29 Statement Training Data.....	61
Gambar 4. 30 Proses tahapan dataset training dan dataset validasi .....	61
Gambar 4. 31 Leaning curve.....	62
Gambar 4. 32 Evaluasi Model dengan Confusion Matrix.....	63
Gambar 4. 33 Hasil evaluasi confusion matrix .....	63