

## DAFTAR ISI

<b>HALAMAN JUDUL.....</b>	<b>i</b>
<b>HALAMAN PENGESAHAN PEMBIMBING.....</b>	<b>ii</b>
<b>HALAMAN PENGESAHAN PENGUJI.....</b>	<b>iii</b>
<b>PERNYATAAN KARYA ASLI.....</b>	<b>iv</b>
<b>PERNYATAAN BEBAS PLAGIASI.....</b>	<b>v</b>
<b>ABSTRAK.....</b>	<b>vi</b>
<b>ABSTRACT.....</b>	<b>vii</b>
<b>KATA PENGANTAR.....</b>	<b>viii</b>
<b>DAFTAR ISI.....</b>	<b>ix</b>
<b>DAFTAR TABEL.....</b>	<b>xi</b>
<b>DAFTAR GAMBAR.....</b>	<b>xii</b>
<b>BAB I PENDAHULUAN .....</b>	<b>1</b>
1.1 Latar Belakang .....	1
1.2 Rumusan Masalah .....	2
1.3 Batasan Masalah.....	2
1.4 Tujuan Penelitian.....	3
1.5 Manfaat Penelitian.....	3
1.6 Tahapan Penelitian .....	3
1.7 Sistematika Penulisan.....	4
<b>BAB II TINJAUAN LITERATUR .....</b>	<b>6</b>
2.1 Landasan Teori .....	6
2.1.1 Segmentasi Pelanggan E-commerce .....	6
2.1.2 Analisis Model RFM.....	6
2.1.3 Algoritma K-Means.....	6
2.1.4 Metode IQR Untuk Deteksi dan Menghapus Outlier.....	7
2.1.5 Metode Silhouette Index .....	8
<b>BAB III METODOLOGI PENELITIAN .....</b>	<b>13</b>
3.1 Metodologi Penelitian .....	13
3.1.1 Identifikasi Masalah .....	14
3.1.2 Studi Literatur .....	14
3.1.3 Pengumpulan Data .....	14
3.1.4 Preprocessing Data.....	17
3.1.5 Outlier Detection .....	20
3.1.6 Data Clustering.....	25
3.1.7 Model Evaluation .....	31
3.2 Metodologi Pengembangan Sistem.....	33
3.2.1 Analisis Kebutuhan Sistem .....	33
3.2.2 Perancangan Sistem.....	34
3.2.3 Pengujian Sistem .....	43

<b>BAB IV HASIL DAN PEMBAHASAN.....</b>	<b>44</b>
4.2 Hasil Penelitian .....	44
4.1.1 Data Initialization.....	45
4.1.2 Preprocessing Data.....	45
4.1.3 Outlier Detection.....	47
4.1.4 Pembobotan Variabel.....	50
4.1.5 Data Clustering.....	51
4.1.6 Model Evaluation.....	53
4.1.7 System Implementation.....	55
4.1.8 System Testing.....	61
4.2 Pembahasan.....	62
<b>BAB V PENUTUP.....</b>	<b>64</b>
5.1 Kesimpulan.....	64
5.2 Saran.....	64
<b>DAFTAR PUSTAKA.....</b>	<b>65</b>

## DAFTAR TABEL

Tabel 2.1 Nilai Silhouette.....	8
Tabel 2.2 Studi Literatur.....	9
Tabel 2.2 State of The Art.....	10
Tabel 2.3 State of The Art.....	11
Tabel 3.1 Pertanyaan Kuesioner.....	15
Tabel 3.2 Parameter Penelitian.....	16
Tabel 3.3 Sorted Data Recency .....	21
Tabel 3.4 Sorted Data Frequency .....	22
Tabel 3.5 Sorted Data Monetary .....	24
Tabel 3.6 Data Sampel Recency, Frequency, Monetary .....	26
Tabel 3.7 Titik Pusat Cluster.....	27
Tabel 3.8 Hasil Clustering Iterasi Satu.....	27
Tabel 3.9 Pusat Cluster Satu Baru.....	28
Tabel 3.10 Pusat Cluster Dua Baru .....	28
Tabel 3.11 Pusat Cluster Tiga Baru .....	29
Tabel 3.12 Pusat Cluster Empat Baru .....	29
Tabel 3.13 Perbandingan Pusat Cluster Baru dan Lama.....	30
Tabel 3.14 Hasil Akhir Proses Clustering.....	30
Tabel 3.13 Hasil Clustering.....	32
Tabel 3.14 Hasil Silhouette Score .....	33
Tabel 3.15 Spesifikasi Kebutuhan Perangkat Keras .....	34
Tabel 3.16 Spesifikasi Kebutuhan Perangkat Lunak .....	34
Tabel 3.17 Rancangan Pengujian Aplikasi.....	43
Tabel 4.1 Proses Import Data .....	45
Tabel 4.2 Proses Removing Unused and Null Data.....	46
Tabel 4.3 Proses Encoding Data.....	47
Tabel 4.4 Proses Outlier Detection .....	48
Tabel 4.5 Proses Outlier Replacement .....	49
Tabel 4.6 Proses Pembobotan Variabel.....	50
Tabel 4.7 Proses Elbow Method dan Silhouette Score.....	51
Tabel 4.8 Proses K-Means Modelling .....	52
Tabel 4.9 Pembagian Cluster Hasil K-Means .....	53
Tabel 4.10 Proses Silhouette Vizualitation.....	54
Tabel 4.11 Hasil Pengujian Aplikasi.....	61
Tabel 4.12 Hasil Pengujian Aplikasi.....	62

## DAFTAR GAMBAR

Gambar 3.1 Alur Tahapan Penelitian.....	13
Gambar 3.2 Kuesioner .....	15
Gambar 3.3 Flowchart Utama .....	17
Gambar 3.4 Flowchart Remove Unused and Null Data.....	18
Gambar 3.5 Flowchart Encoding Data.....	19
Gambar 3.6 Flowchart Outlier Detection.....	20
Gambar 3.6 Flowchart Clustering Data .....	26
Gambar 3.7 Flowchart Model Evaluation.....	31
Gambar 3.8 Rancangan Arsitektur Sistem.....	34
Gambar 3.9 Proses DFD Level 0 .....	35
Gambar 3.10 Proses DFD Level 1 .....	36
Gambar 3.11 Proses DFD Level 2 - Remove Unused Data and Null Value .....	36
Gambar 3.12 Proses DFD Level 2 - Encoding Data .....	37
Gambar 3.13 Proses DFD Level 2 - Outlier Detection .....	37
Gambar 3.14 Proses DFD Level 2 - Modelling .....	38
Gambar 3.15 Proses DFD Level 2 - Model Evaluation .....	39
Gambar 3.16 Rancangan Halaman Raw Data.....	40
Gambar 3.17 Rancangan Halaman Data Cleansing .....	40
Gambar 3.18 Rancangan Halaman Data Preparation.....	41
Gambar 3.19 Rancangan Halaman Modelling .....	41
Gambar 3.20 Rancangan Halaman Clustering Comparison .....	42
Gambar 3.20 Rancangan Halaman Clustering Comparison .....	42
Gambar 4.1 Tampilan Aplikasi Sistem Klasterisasi Pelanggan E-Commerce .....	44
Gambar 4.2 Hasil Removing Unused and Null Data.....	46
Gambar 4.3 Hasil Encoding Data .....	47
Gambar 4.4 Hasil Outlier Detection .....	48
Gambar 4.5 Hasil Outlier Replacement .....	49
Gambar 4.6 Hasil Pembobotan Variabel .....	50
Gambar 4.7 Hasil Visualisasi Elbow Method dan Silhouette Score.....	52
Gambar 4.8 Hasil Silhouette Vizualitation.....	55
Gambar 4.9 Halaman Raw Data.....	56
Gambar 4.10 Halaman Data Cleansing - Remove Unused and Null Data .....	56
Gambar 4.11 Halaman Data Cleansing - Encoded Data .....	57
Gambar 4.12 Halaman Data Preparation - Outliers Detection.....	57
Gambar 4.13 Halaman Data Preparation - Outliers Replacement.....	58
Gambar 4.14 Halaman Modelling - Elbow Method and Silhouette Score.....	58
Gambar 4.15 Halaman Modelling - Clustering Result.....	59
Gambar 4.16 Halaman Data Comparison - Before IQR Optimization .....	59
Gambar 4.17 Halaman Data Comparison - After IQR Optimization .....	60
Gambar 4.18 Halaman Cluster Analysis - Final Analysis .....	60
Gambar 4.19 Halaman Cluster Analysis - Model Evaluation.....	61