



DAFTAR ISI

HALAMAN JUDUL.....	i
PERNYATAAN BEBAS PLAGIARISME	ii
KATA PENGANTAR	vi
DAFTAR ISI.....	viii
DAFTAR TABEL.....	xi
DAFTAR GAMBAR	xii
DAFTAR LAMBANG DAN SINGKATAN	xiv
INTISARI.....	xv
ABSTRACT	xvi
BAB I PENDAHULUAN	1
I.1. Latar Belakang	1
I.2. Perumusan Masalah	5
I.2.1. Batasan Masalah	5
I.3. Tujuan Penelitian	6
I.4. Manfaat Penelitian	6
BAB II TINJAUAN PUSTAKA.....	7
BAB III DASAR TEORI	14
III.1. Bahasa Isyarat Indonesia.....	14
III.2. Kecerdasan Buatan.....	15
III.3. Pembelajaran Mesin	16
III.4. <i>Deep Learning</i>	20
III.5. <i>Computer Vision</i>	21
III.6. Deteksi Objek.....	22
III.7. Jaringan Saraf Tiruan	24
III.7.1. Struktur Dasar Jaringan Saraf Tiruan.....	25
III.7.2. Cara Kerja Jaringan Saraf Tiruan.....	26
III.8. <i>Convolutional Neural Network</i>	28
III.8.1. <i>Convolution Layer</i>	29
III.8.2. <i>Pooling Layer</i>	32
III.8.3. <i>Fully Connected Layer</i>	35





III.8.4. Fungsi Aktivasi	36
III.8.5. <i>Gradient Descent</i> dan <i>Batch Normalization</i>	45
III.8.6. <i>Dropout</i>	46
III.8.7. <i>Depthwise Separable Convolution</i>	47
III.9. <i>Epoch</i> , <i>Batch Size</i> dan <i>Learning Rate</i>	48
III.9.1. <i>Epoch</i>	48
III.9.2. <i>Batch Size</i>	48
III.9.3. <i>Learning Rate</i>	49
III.10. Adam <i>Optimizer</i>	49
III.11. <i>Transfer Learning</i>	50
III.12. EfficientDet	52
III.12.1. <i>Network Architecture</i>	52
III.12.2. EfficientNet	54
III.12.3. BiFPN	56
III.12.4. EfficientDet-Lite	58
III.13. <i>Loss Function</i>	59
III.13.1. <i>Cross-Entropy Loss</i>	59
III.13.2. Huber <i>Loss</i>	60
III.13.3. L2 <i>Regularization</i>	61
III.14. <i>Performance Evaluation</i>	61
III.14.1. <i>Confusion Matrix</i> dan <i>Evaluation Metrics</i>	61
III.14.2. <i>Intersection of Union</i>	65
III.14.3. <i>Mean Average Precision</i>	66
III.15. Sistem Instrumentasi Visual.....	68
III.16. Google Coral Dev Board.....	70
BAB IV PELAKSANAAN PENELITIAN	73
IV.1. Alat dan Bahan Penelitian.....	73
IV.1.1. Alat Penelitian.....	73
IV.1.2. Bahan Penelitian	78
IV.2. Tata Laksana Penelitian	80
IV.2.1. Studi Literatur	81
IV.2.2. Pengumpulan Data	81





IV.2.3. Pra-Pemrosesan Data	81
IV.2.4. Perancangan dan Pelatihan Model Berbasis <i>Transfer Learning</i>	82
IV.2.5. Pengujian Model CNN.....	84
IV.2.6. Perancangan Sistem Pengenalan Berbasis Google Coral	85
IV.2.7. Pengujian Performa Model pada Sistem Pengenalan Berbasis Google Coral.....	86
IV.2.8. Analisis dan Pembahasan.....	86
IV.2.9. Penulisan Laporan.....	87
IV.3. Tuntutan Perancangan.....	87
BAB V HASIL DAN PEMBAHASAN.....	88
V.1. Pengumpulan dan Pengolahan Data.....	88
V.2. Perancangan Model Berbasis <i>Transfer Learning</i>	92
V.3. Pelatihan Model.....	93
V.3.1. <i>Hyperparameter Tuning Epoch</i>	93
V.3.2. <i>Hyperparameter Tuning Learning Rate</i>	95
V.3.3. <i>Hyperparameter Tuning Batch Size</i>	98
V.4. Hasil Pelatihan Model	101
V.5. Pengujian dan Evaluasi Kinerja Model.....	104
V.5.1. Analisis Kinerja Model EfficientDet-Lite2.....	106
V.5.2. Hasil Pengujian Model	110
V.6. Evaluasi Sistem Google Coral.....	111
BAB VI KESIMPULAN DAN SARAN	122
VI.1. Kesimpulan	122
VI.2. Saran	122
DAFTAR PUSTAKA	123
LAMPIRAN	130
LAMPIRAN A TABEL HASIL EVALUASI MODEL	131

