

DAFTAR ISI

KATA PENGANTAR	i
DAFTAR ISI	ii
DAFTAR GAMBAR	v
DAFTAR TABEL	viii
INTISARI.....	ix
ABSTRACT.....	x
BAB I PENDAHULUAN	1
1.1 Latar Belakang	1
1.2 Rumusan Masalah	3
1.3 Batasan Masalah.....	3
1.4 Tujuan Penelitian	4
1.5 Manfaat Penelitian	4
BAB II TINJAUAN PUSTAKA.....	5
BAB III LANDASAN TEORI.....	16
3.1 Kecerdasan Artifisial.....	16
3.2 Machine Learning	16
3.3 Reinforcement Learning.....	17
3.4 Deep Learning.....	17
3.5 Deep Reinforcement Learning	18
3.6 Convolutional Neural Network	19
3.7 Residual Neural Network.....	20
3.8 Monte Carlo Tree Search	21
3.9 Self-play	22
3.10 Alpha Zero	23
3.11 Categorical Cross-Entropy	24
3.12 Mean Squared Error	24

BAB IV METODOLOGI PENELITIAN	26
4.1 Deskripsi Penelitian	26
4.2 Tahapan Penelitian	26
4.3 Analisis Sistem.....	28
4.4 Perancangan Sistem	30
4.4.1 Rancangan Algoritma Deep Reinforcement Learning.....	31
4.4.2 Arsitektur Convolutional Neural Network.....	34
4.4.3 Arsitektur Residual Neural Network.....	37
4.4.4 Environment.....	39
4.5 Evaluasi Model.....	39
BAB V IMPLEMENTASI.....	41
5.1 Deskripsi Implementasi.....	41
5.2 Instalasi dan Impor Pustaka	41
5.3 Implementasi Kelas Dotdict.....	42
5.4 Implementasi Monte Carlo Tree Search	43
5.4.1 Fungsi Constructor Kelas MCTS	43
5.4.2 Fungsi getActionProb	44
5.4.3 Fungsi Search.....	45
5.5 Implementasi Permainan Othello.....	47
5.5.1 Implementasi Logika Permainan Othello.....	47
5.5.2 Implementasi Environment Permainan Othello.....	56
5.6 Implementasi Algoritma Alpha Zero	65
5.6.1 Implementasi Kelas Arena	65
5.6.2 Implementasi Kelas Coach.....	70
5.7 Implementasi Arsitektur Deep Neural Network	77
5.7.1 Implementasi Arsitektur Convolutional Neural Network	78

5.7.2 Implementasi Arsitektur Residual Neural Network.....	79
5.7.3 Implementasi Kelas Wrapper Neural Network.....	80
5.8 Implementasi Training Agen	84
5.9 Implementasi Evaluasi Penelitian	90
BAB VI HASIL DAN PEMBAHASAN	93
6.1 Hasil Training Model	93
6.1.1 Hasil Training Model CNN.....	93
6.1.2 Hasil Training Model ResNet	98
6.2 Hasil Evaluasi Pertandingan Model	104
BAB VII KESIMPULAN DAN SARAN	107
7.1 Kesimpulan	107
7.2 Saran.....	109
DAFTAR PUSTAKA	110