

DAFTAR ISI

| | |
|--|------|
| COVER..... | i |
| HALAMAN JUDUL | ii |
| HALAMAN PENGESAHAN PEMBIMBING..... | iii |
| HALAMAN PENGESAHAN PENGUJI | iv |
| PERNYATAAN KARYA ASLI | v |
| PERNYATAAN BEBAS PLAGIASI | vi |
| KATA PENGANTAR | vii |
| ABSTRAK..... | viii |
| ABSTRACT..... | ix |
| DAFTAR ISI..... | x |
| DAFTAR GAMBAR | xiii |
| DAFTAR TABEL..... | xiv |
| DAFTAR PERSAMAAN..... | xv |
| DAFTAR ALGORITMA..... | xvi |
| BAB I PENDAHULUAN..... | 1 |
| 1.1 Latar Belakang | 1 |
| 1.2 Rumusan Masalah..... | 2 |
| 1.3 Batasan Masalah | 2 |
| 1.4 Tujuan Penelitian | 2 |
| 1.5 Manfaat Penelitian | 2 |
| 1.6 Metodologi Penelitian dan Pengembangan Sistem..... | 2 |
| 1.6.1 Metodologi Penelitian..... | 3 |
| 1.6.2 Metodologi Pengembangan Sistem..... | 3 |
| 1.7 Sistematika Penulisan | 3 |
| BAB II..... | 5 |
| TINJAUAN PUSTAKA | 5 |
| 2.1 Definisi Otak..... | 5 |
| 2.2 Penyakit Tumor Otak..... | 5 |
| 2.2.1 <i>Citra MRI</i> tumor otak..... | 5 |
| 2.2.2 <i>Citra MRI</i> otak normal..... | 6 |
| 2.3 Magnetic Resonance Imaging (MRI)..... | 7 |
| 2.4 Augmentasi Data..... | 7 |

| | | |
|---|---|-----------|
| 2.5 | Convolutional Neural Network (CNN)..... | 8 |
| 2.5.1 | Convolutional Layer | 8 |
| 2.5.2 | Pooling Layer..... | 9 |
| 2.5.3 | Fully Connected Layer..... | 9 |
| 2.5.4 | Dropout | 10 |
| 2.6 | Activation Function | 10 |
| 2.6.1 | ReLU (Rectrified Linear Unit)..... | 10 |
| 2.6.2 | Sofmax | 10 |
| 2.7 | Pengolahan Citra..... | 10 |
| 2.7.1 | Operasi Pada Pengolahan Citra..... | 11 |
| 2.8 | Artificial neural network..... | 11 |
| 2.9 | Klasifikasi Citra | 12 |
| 2.10 | Algoritma Optimasi | 12 |
| 2.10.1 | Adam optimizer | 12 |
| 2.10.2 | RMSProp Optimizer | 12 |
| 2.10.3 | Stochastic Gradient Desent (SGD) Optimizer | 13 |
| 2.11 | Hyperparameter Epoch | 13 |
| 2.12 | Evaluasi Model | 14 |
| 2.12.1 | Akurasi..... | 14 |
| 2.12.2 | Confusion Matrix | 14 |
| 2.13 | Tinjauan Literatur | 15 |
| BAB III METODOLOGI PENELITIAN DAN PENGEMBANGAN SISTEM..... | | 21 |
| 3.1 | Metodologi Penelitian..... | 21 |
| 3.1.1 | Pengumpulan Data & Pembagian Data..... | 22 |
| 3.1.2 | Pre-processing..... | 22 |
| 3.1.3 | Melatih Dataset Menggunakan Metode CNN..... | 24 |
| 3.1.4 | Rencana Pengujian dan Indikator Keberhasilan Penelitian | 32 |
| 3.2 | Metodologi Pengembangan Sistem..... | 33 |
| 3.2.1 | Analisa Kebutuhan Sistem..... | 34 |
| 3.2.2 | Desain Sistem..... | 34 |
| 3.2.3 | Pengujian Sistem..... | 37 |
| BAB IV HASIL DAN PEMBAHASAN | | 39 |
| 4.1 | Implementasi Model Convolutional Neural Network..... | 39 |
| 4.1.1 | Proses Import <i>Library</i> | 39 |

| | | |
|---------------------------|---|----|
| 4.1.2 | Proses Import Data..... | 39 |
| 4.1.3 | Proses Augmentasi Data | 39 |
| 4.1.4 | Membangun Generator Data..... | 40 |
| 4.1.5 | Membangun Model CNN | 41 |
| 4.1.6 | Proses Pelatihan Model CNN | 41 |
| 4.1.7 | Evaluasi Model CNN..... | 42 |
| 4.2 | Implementasi Sistem..... | 44 |
| 4.3 | Hasil Pengujian Model Convolutional Neural Network..... | 47 |
| 4.3.1 | Analisis Pengujian Model Convolutional Neural Network | 48 |
| 4.4 | Hasil Penelitian | 49 |
| 4.5 | Pembahasan..... | 53 |
| BAB V | | 54 |
| KESIMPULAN DAN SARAN..... | | 54 |
| 5.1 | Kesimpulan | 54 |
| 5.2 | Saran | 54 |
| DAFTAR PUSTAKA | | 55 |