ANALYTIC OF IMAGE POSTS ON SOCIAL MEDIA FOR HATE SPEECH

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DECLARATION

I declare that this is my own work and this thesis/dissertation does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other University or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text. I retain the right to use this content in whole or part in future works (such as articles or books).

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Signature: Date: 29/07/2025

The above candidate has carried out research for the MPhil thesis/dissertation under my supervision. I confirm that the declaration made above by the student is true and correct.

Name of Supervisor: Dr. L. Ranathunga

Signature of the Supervisor: Date: 29/07/2025

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ABSTRACT

Social media platforms have been developing rapidly for the last thirteen years. Billions of people communicate their ideas, information and other expressions with each other through social media. Recently most of the fake news and hate speech have spread by image posts and videos in Facebook, YouTube and Twitter platforms within Sri Lankan community. There is a vital need for obtaining the meaning of the image posts automatically. This research has been supported to the above solution and done to automatically separation and identification of Sinhala and Singlish text in image posts and video thumbnails in social media platforms. This research has three research module components. The first component is the main research component. It is the extraction of Sinhala and English text in social media images. Image posts and video thumbnails were acquired from Facebook and YouTube social media platforms which are on public. Three main algorithms and another three supporting algorithms have been derived to complete this component. They are text detection, text glow removing, text line segmentation, touching character segmentation, Sinhala English character separation and Sinhala English character recognition. The study has achieved the text line segmentation accuracy of 90% for 1,669 text lines and the overall touching character segmentation accuracy of 98% for 58,403 characters and the overall script separation accuracy of 93% for 22,383 script images. A new feature vector was formed in this study and 11,088 Sinhala script images were trained in a sequential model neural network. The accuracy of printed Unicode Sinhala character recognition is higher than the accuracy of printed non-Unicode and handwritten Sinhala character recognition. In the second component, a simple algorithm has been derived to identify the status of social issues in images which is connector module for the main research group work. In the third component, it is tested with three methods to identify key attributes of images to detect redistribution of images within social media and selected the Brute-Force Matcher with ORB descriptors as the highest accuracy obtained by this method.

Keywords:

Social Media Images, Text Detection, Segmentation, Sinhala English Separation, Character Recognition

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LIST OF ABBREVIATIONS

Abbreviation	Description
BF Matcher	Brute-Force Matcher
BRIEF	Binary Robust Independent Elementary Features
CER	Character Error Rate
CNN	Convolutional Neural Network
DAWG	Directed Acyclic Word Graph
EAST	Efficient and Accurate Scene Text Detector
FAST	Features from Accelerated Segment Test
FITI	From Innovation to Impact
FLANN	Fast Library for Approximate Nearest Neighbors
FN	False Negative
FP	False Positive
IEEE	Institute of Electrical and Electronic Engineers
JPG	Joint Photographic Experts Group
KNN	K Nearest Neighbors
LSTM	Long Short-Term Memory
MDLSTM	Multidimensional Long Short-Term Memory
MLP	Multi-Layer Perceptron
MSER	Maximally Stable Extremal Region
NLP	Natural Language Processing
OCR	Optical Character Recognition
OpenCV	Open Computer Vision Library
ORB	Oriented FAST and Rotated BRIEF
PCA	Principal Component Analysis
SGD	Stochastic Gradient Descent
SIFT	Scale-Invariant Feature Transform
SOM	Self-Organizing Feature Maps

SVM	Support Vector Machine
TN	True Negative
TP	True Positive
UTF-8	Unicode Transformation Format – 8 bits
VPN	Virtual Private Networks
WER	Word Error Rate

List of Appendices