

(54) Title of the invention : MACHINE LEARNING TECHNIQUES FOR DETECTION OF OFFENSIVE AND HATE SPEECH IN TWEETS OF REGIONAL LANGUAGES

(51) International classification :G06K0009620000, G06N0020000000, G06F0040300000, G06N0020100000,  
 G06N0020200000  
 (86) International Application No :PCT//  
 Filing Date :01/01/1900  
 (87) International Publication No : NA  
 (61) Patent of Addition to Application Number :NA  
 Filing Date :NA  
 (62) Divisional to Application Number :NA  
 Filing Date :NA

(71)Name of Applicant :  
**1)St. Martin's Engineering College**  
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----  
**Name of Applicant : NA**  
**Address of Applicant : NA**  
 (72)Name of Inventor :  
**1)Dr. P Santosh Kumar Patra Professor, Dept. of CSE**  
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----  
**2)Dr. B. Rajalingam Associate Professor, CSE**  
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----  
**3)Dr. K Srinivas Associate Professor, CSE**  
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----  
**4)Mahaboob Shubhani Assistant Professor, CSE**  
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----  
**5)Dr. G.Jawaherlalchenu Associate Professor, CSE**  
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----  
**6)Gangula Hemanth Reddy Student CSE**  
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----  
**7)Kankati Shivakumar Student CSE**  
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----  
**8)Srihari Phani Kumar Student CSE**  
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----  
**9)Varun Godavarthi Student CSE**  
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----  
**10)Royyapally Manikanth Goud Student CSE**  
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----  
**11)Kallepelli Meghashank Student CSE**  
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----  
**12)Lothith Valluripally Student CSE**  
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----  
**13)Jungam Tharun Student CSE**  
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----  
**14)Gaddam Pranav Reddy Student CSE**  
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----

(57) Abstract :

In recent times, regional languages have been witnessing insurgence of offensive and hate speech along racial and ethnic dispositions on Twitter. Popular among the regional languages used is English. Although, machine learning has been successfully used to detect offensive and hate speech in several English contexts, the distinctiveness of regional languages tweets and the similarities among offensive, hate and free speeches require domain-specific English corpus and techniques to detect the offensive and hate speech. Thus, we developed an English corpus from regional languages tweets and evaluated different machine learning techniques to detect offensive and hate speech. Character n-gram, word n-gram, negative sentiment, syntactic-based features and their hybrid were extracted and analyzed using hyper-parameter optimization, ensemble and multi-tier meta-learning models of support vector machine, logistic regression, random forest, gradient boosting algorithms. The results showed that optimized support vector machine with character n-gram performed best in detection of hate speech with true positive rate of 0.894, while optimized gradient boosting with word n-gram performed best in detection of hate speech with true positive rate of 0.867. However, their performances in detection of other threatening classes were poor. Multi-tier meta-learning models achieved the most consistent and balanced classification performance with true positive rates of 0.858 and 0.887 for hate speech and offensive speech, respectively as well as true positive rate of 0.646 for free speech and overall accuracy of 0.671. The error analysis showed that multi-tier meta-learning model could reduce the misclassification error rate of the optimized models by 34.26%.

No. of Pages : 15 No. of Claims : 5