Multi-Modal Human Personality Profiling System

Srikanth S Iyer
Srivarsha Elangovan
Faculty Mentor : Dr. N. Sujaudeen

SSN College of Engineering, Chennai

November 9, 2022

Introduction

- Personality can be defined as the characteristics that help to predict an individual's behaviour.
- It plays an important role on how we live, speak, respond, and express ourselves.
- Personality Assessment/Analysis involves the scoring and interpretation of empirically supported measures of personality traits.
- Personality assessment of a person helps us to understand how one handles various real-time situations.
- Personality profiling has a wide range of real-world applications, such as HR interview shortlisting, recommendation systems, etc.

Problem Statement

- The personality profiling tool is a simple, cost effective, embeddable system which analyzes an individual's behaviour to predict his/her personality.
- The problem statement is to build a model of Multi-Modal Human Personality Profiling System (MHPPS) that accurately determines the extroversion of a person, thereby allocating a sociability score.
- The generated score will be based on a multi-modal input analysis – twitter tweets, a short audio interview and a brief real-time video tracking.

Related Works

Paper	Proposed System	Methodology	Merits	Drawbacks
R. Moraes, L. L. Pinto, M. Pilankar and P. Rane, "Personality Assessment Using Social Media for Hiring Candidates," 2020 3rd International Conference on Communication System, Computing and IT Applications (CSCITA), 2020.	Aims to extract tweets from a candidate's account and perform personality assessment to aid the recruiting team with the interview process; compares the performance of various supervised learning algorithms.	Myers Briggs Type Indicator (MBTI), Big Five (OCEAN), Decision Tree, Naïve Bayes, K-Nearest Neighbors (kNN), Support Vector Machine (SVM)	MBTI and Big Five results of the user are obtained using ML algorithms on user's tweets; the results are mapped using the theoretical model to obtain desirable job traits and roles of the user.	Improved results can be achieved using datasets native to the user's region and understanding their local linguistics. A semantic approach can also be tried for better outcomes.

Related Works

Paper	Proposed System	Methodology	Merits	Drawbacks
M. Karnakar, H. U. Rahman, A. B. J. Santhosh and N. Sirisala, "Applicant Personality Prediction System Using Machine Learning," 2021 2nd Global Conference for Advancement in Technology (GCAT), 2021.	Aims to determine whether a person is suitable for a job profile or not and give personality type of a candidate using a logistic regression algorithm and matching percentage of resume with job description.	Multinomial Logistic Regression, NTLK, Spacy, TF-IDF vectorization, Big Five (OCEAN)	Reduces the workload and time of hiring department and has high performance and accuracy (79.47%) in selecting the best and skilled candidate according to their requirement.	In the event of low matching percentage between resume and job description, suggestions for suitable job profiles can be given.

Related Works

Paper	Proposed System	Methodology	Merits	Drawbacks
S. Anglekar et al, "A Deep Learning based Self-Assessment Tool for Personality Traits and Interview Preparations," 2021 International Conference on Communication information and Computing Technology (ICCICT), 2021.	Aims to create a platform to identify the personality traits of an individual and provide aid in suggesting changes, if required.	NLP, Sentiment Analysis, CNN, MobileNet, TensorFlow, OpenCV	Results of each of the four modules – GD, Questionnaire, Video Interview & Telephonic Interview are combined to determine the job profile that suits the user's personality.	Companies best suited to the user's personality and qualities can be predicted; specifications related to the profile such as working hours can also be determined.

Related Works

Paper	Proposed System	Methodology	Merits	Drawbacks
M. Qodseya, F. Panta and F. Sedes, "Visual-Based Eye Contact Detection in Multi-Person Interactions," 2019 International Conference on Content-Based Multimedia Indexing (CBMI), 2019.	Proposes a novel geometric method to detect eye contact in natural multi-person interactions without the need for any intrusive eye-tracking device.	OpenFace toolkit, Weka tool, Random Forest, Naïve Bayes, J48, ANN	The proposed method, tested on a recent dataset of natural group interactions is highly efficient w.r.t classification performance, compared to classical, supervised methods.	Considering other non-verbal cues such as facial expressions and fusing them with eye contact detection can reduce the ratio of total failure.

Related Works

Paper	Proposed System	Methodology	Merits	Drawbacks
A. F. Nafis, D. Adni Navastara and A. Yuniarti, "Facial Expression Recognition on Video Data with Various Face Poses Using Deep Learning," 2020 12th International Conference on Information Technology and Electrical Engineering (ICITEE), 2020.	Aims to build a deep learning model that recognizes facial expressions from video data and classify them into one of the seven classes – anger, disgust, fear, happiness, sadness, surprise & neutral.	R-CNN, Deep Learning, Facial Expression Recognition, You Only Look Once (YOLO)	The proposed YOLO model produces the best accuracy of 94% on the CK+ dataset, with an average accuracy of 87% on channel 3 and a learning rate of 0.01	Subject of the dataset can have explicit facial expressions in the same video, which can then be distinguished from one another.

Related Works

Paper	Proposed System	Methodology	Merits	Drawbacks
J. Tuesta, D. Albornoz, G. Kemper and C. A. Almenara, "A Sociometric Sensor Based on Proximity, Movement and Verbal Interaction Detection," 2019 International Conference on Information Systems and Computer Science (INCISCOS), 2019.	Proposes the development of a sociometric sensor capable of detecting proximity, movement and verbal interaction between people.	RSSI, ESP8266 WIFI NodeMCU module, MPU6050 module, MAX9814 module, DS3231 RTC module and the microSD card adapter	Developed a sociometric sensor capable of providing reliable information to a psychologist (92.5% success in MAD, 87.5% success in VAD & 90% success in proximity detection.	Other hardware modules that can improve the current success rate need to be evaluated.

Proposed System

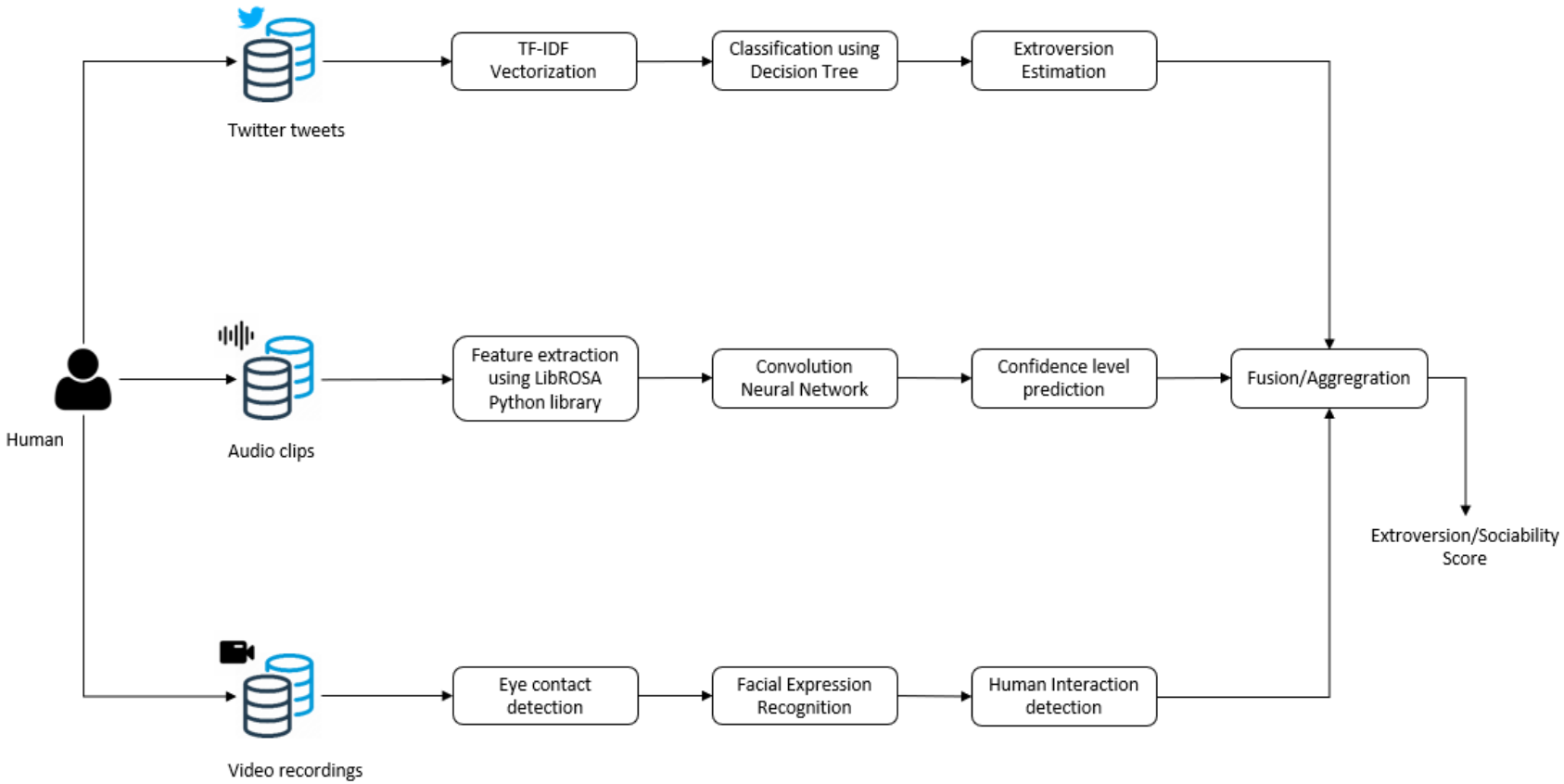

Figure: MHPPS Architecture

Proposed System

- Our proposed system, MHPPS aims to solve the aforementioned problem on human personality profiling. The system comprises 3 major modules – the Social Media Analysis module, the Telephonic Interview module and the Real-Time Video Tracking module.
- The Social Media Analysis module predicts the user's degree of extroversion by analyzing the tweets on his Twitter profile.
- The Telephonic Interview module has the responsibility of examining a short audio clip ($\sim$ 2 min) of the user and determining his/her level of confidence.
- The Real-Time Video Tracking module captures a brief video ($\sim$ 5 min) of the user's day-to-day activities and counts the number of human interactions based on eye contact detection and facial expression recognition.
- The results of each of the three modules are then combined to predict the extroversion/sociability score of an individual.

Motivation/Justification

- Personality profiling has been achieved using various input data - questionnaires, social media posts & audio/video interviews.
- Our proposed system seeks to predict user personality based on a multi-modal input so as to achieve a higher classification accuracy.
- Human interaction detection using sensors has been examined; detection via real-time video analysis, however, remains an unexplored domain of research.
- The proposed system comprises a Real-Time Video Tracking module that aims to detect human interaction by combining two available models - eye contact detection and facial expression recognition.
- Interaction is detected in the event of intersection of the individuals' viewing sphere and presence of a happy expression on their faces.

Feasibility Study

- Datasets for the various modules are readily available :
  - Kaggle's MBTI Big Five datasets for twitter tweets
  - RAVDESS and SAVEE datasets for audio analysis
  - CK+, ImageNet and IMED datasets for facial expression recognition
- Test data can also be obtained hands-on from peers and acquaintances.
- Various Python libraries such as BeautifulSoup, Selenium, html5lib are available for web-scraping operations and supervised machine learning algorithms such as Random Forest, Naïve Bayes, SVM etc. aid in the classification process.
- The best technologies for each module can then be selected on the basis of requirements and performance parameters (accuracy, precision, recall etc.)

Thank You

References

[1] R. Moraes et al, "Personality Assessment Using Social Media for Hiring Candidates," 2020 3rd International Conference on Communication System, Computing and IT Applications (CSCITA), 2020.

[2] M. Karnakar et al, "Applicant Personality Prediction System Using Machine Learning," 2021 2nd Global Conference for Advancement in Technology (GCAT), 2021.

[3] S. Anglekar et al, "A Deep Learning based Self-Assessment Tool for Personality Traits and Interview Preparations," 2021 International Conference on Communication information and Computing Technology (ICCICT), 2021.

References

[4] M. Qodseya et al, "Visual-Based Eye Contact Detection in Multi-Person Interactions," 2019 International Conference on Content-Based Multimedia Indexing (CBMI), 2019.

[5] A. F. Nafis et al, "Facial Expression Recognition on Video Data with Various Face Poses Using Deep Learning," 2020 12th International Conference on Information Technology and Electrical Engineering (ICITEE), 2020.

[6] J. Tuesta et al, "A Sociometric Sensor Based on Proximity, Movement and Verbal Interaction Detection," 2019 International Conference on Information Systems and Computer Science (INCISCOS), 2019.