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*Original Article*

# Automated Tensor Flow-Based Personality Identification for Asynchronous Video Interviews

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***Abstract:*** *In today's digital age, recruitment processes are increasingly relying on technology-driven solutions to streamline and enhance candidate assessment. This project proposes a TensorFlow-based framework for automatic personality recognition (APR) applied to asynchronous video interviews. Leveraging machine learning techniques, particularly deep neural networks, the system analyses candidates' facial expressions, voice tone, and linguistic patterns to infer personality traits. By integrating TensorFlow's robust infrastructure, the model achieves high accuracy in identifying key personality dimensions such as extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience. The proposed framework offers several advantages, including scalability, efficiency, and objectivity in candidate evaluation. Implementation of this system in asynchronous video interviews promises to revolutionize the recruitment process, providing valuable insights to employers while enhancing candidate experience and fairness.*

***Keywords:*** *TensorFlow, Automatic Personality Recognition (APR), Asynchronous Video Interviews, Machine Learning, Deep Neural Network.*

## INTRODUCTION

The advent of technology has catalysed significant transformations in various aspects of human life, including the realm of recruitment and hiring processes. Traditional methods of candidate evaluation are gradually being supplanted by innovative, technology-driven solutions aimed at enhancing efficiency, objectivity, and fairness. Among these advancements, automatic personality recognition (APR) stands out as a promising tool for assessing candidates' suitability for roles based on their personality traits. TensorFlow, a widely used open-source machine learning framework, provides a robust infrastructure for developing and deploying sophisticated models for personality recognition. By analyzing candidates' facial expressions, voice tone, and linguistic patterns extracted from video interviews, TensorFlow-based systems can infer personality traits with remarkable accuracy.

This project aims to explore the potential of TensorFlow-based APR in the context of asynchronous video interviews. By harnessing the power of machine learning, this framework seeks to revolutionize the recruitment process, offering scalability, efficiency, and objectivity in candidate evaluation. Moreover, the integration of such technology promises to enhance candidate experience and fairness while providing valuable insights to employers for making informed hiring decisions.

## LITERATURE SURVEY

**Culture and testing practices: is the world flat?**

Much has been speculated regarding the influence of cultural norms on the acceptance and use of personnel selection testing. This study examined the cross-level direct effects of four societal cultural variables (performance orientation, future orientation, uncertainty avoidance and tightness-looseness) on selection practices of organizations in 23 countries. 1,15 HR professionals responded to a survey regarding testing practices in hiring contexts. Overall, little evidence of a connection between cultural practices and selection practices emerged. Implications of these findings for personnel selection and cross-cultural research as well as directions for future work in this area are described.

**Faking it! Individual differences in types and degrees of faking behavior:**

Personality measures are commonly used in personnel selection and other high-stakes situations. In these settings , respondents may engage in purposeful deception, or faking, to increase the likelihood of

receiving a valued outcome (i.e., being offered a job). However, some individuals may tend to only fake slightly, others may demonstrate more extreme response tendencies, and others may respond honestly. In this study, we used within-person, two-wave data to investigate faking on a conscientiousness measure across honest-responding and faking conditions using latent transition analysis (LTA) to identify different types of fakers. Agreeableness, neuroticism, and the perceived ability to deceive (PATD), obtained in the honest-responding condition, were used to predict faking behavior patterns.

We also examined whether counterproductive workplace behavior (CWB) differed across the faking types. Results supported three-class solutions in both honest-responding and faking conditions, and that respondents could be classified as honest respondents, slight fakers, and extreme fakers. Results partially supported the role of high agreeableness and low neuroticism as predictive of stable response patterns. PATD results did not suggest a significant predictive relation with faking behavior. Extreme fakers were also found to generally exhibit the highest levels of CWBs. Implications and directions for continued research are discussed.

**Can nonverbal cues be used to make meaningful personality attributions in employment interviews?**

Purpose This study examines the role of personality attributions in understanding the relationships between nonverbal cues and interview performance ratings. Design/methodology/approach A structured behavioural interview was developed for identifying management potential in a large, national company. Using a concurrent design to validate the interview, managers were interviewed and the interviews were videotaped (n = 110). These videotapes were used as stimuli for ratters in this study. Findings Results indicate that raters can make personality attributions using only one channel of information and these attributions partly explain the relationships between nonverbal cues and performance measures.

Furthermore, conscientiousness attributions explain the relationship between visual cues and interview ratings, extraversion attributions mediate the relationship between vocal cues and interview ratings. Neuroticism attributions had a suppressing effect for both visual and vocal cues. Implications No matter how much an interview is structured, nonverbal cues cause interviewers to make attributions about candidates. If we face this fact, rather than consider information from cues as bias that should be ignored, interviewers can do a better job of focusing on job-related behavior and information in the interview, while realizing that the cues are providing information that must be attended to. Originality/value This study isolated the sources of information provided to raters to either the vocal or the visual channel to examine their impact individually. A Brunswick lens model shows the potential impact of personality attributions predicting both job and interview performance ratings when both channels of information are used.

**Asynchronous video interviewing as a new technology in personnel selection: the applicant's point of view:**

The present study aimed to integrate findings from technology acceptance research with research on applicant reactions to new technology for the emerging selection procedure of asynchronous video interviewing. One hundred six volunteers experienced asynchronous video interviewing and filled out several questionnaires including one on the applicants' personalities. In line with previous technology acceptance research, the data revealed that perceived usefulness and perceived ease of use predicted attitudes toward asynchronous video interviewing.

Furthermore, openness revealed to moderate the relation between perceived usefulness and attitudes toward this particular selection technology. No significant effects emerged for computer self-efficacy, job interview self-efficacy, extraversion, neuroticism, and conscientiousness. Theoretical and practical implications are discussed.

**A survey of personality computing:**

Personality is a psychological construct aimed at explaining the wide variety of human behaviours in terms of a few, stable and measurable individual characteristics. In this respect, any technology involving understanding, prediction and synthesis of human behavior is likely to benefit from Personality Computing approaches, i.e. From technologies capable of dealing with human personality. This paper is a survey of such technologies and it aims at providing not only a solid knowledge base about the state-of-the-art, but also a conceptual model underlying the three main problems addressed in the literature, namely

Automatic Personality Recognition (inference of the true personality of an individual from behavioural evidence), Automatic Personality Perception (inference of personality others attribute to an individual based on her observable behavior) and Automatic Personality Synthesis (generation of artificial personalities via embodied agents). Furthermore, the article highlights the issues still open in the field and identifies potential application areas.

**Improving socially-aware recommendation accuracy through personality:**

In order to innovatively solve cold-start problems, research involving trust and socially aware recommender systems is currently proliferating. The relative importance of academic conferences has led to the necessity of recommender systems that seek to generate recommendations for conference attendees. In this paper, we aim to improve the recommendation accuracy of socially-aware recommender systems by proposing a linear hybrid recommender algorithm called Personality and Socially-Aware Recommender (PerSAR). PerSAR hybridizes the social and personality behaviours of smart conference attendees.

Our recommendation methodology mainly aims to employ an algorithmic framework that computes the personality similarities and tie strengths of conference attendees so that effective and reliable recommendations can be generated for them using a relevant dataset. The experimental results substantiate that our proposed recommendation method is favourable and outperforms other related and contemporary recommendation methods and techniques.

## METHODOLOGY

The emerging technology in TensorFlow-based automatic face recognition used in asynchronous video interviews is the integration of attention mechanisms in convolutional neural networks (CNNs).Attention mechanisms have been widely used in natural language processing tasks to selectively focus on specific parts of input sequences. In the context of face recognition, attention mechanisms can be applied to highlight important facial regions or features that are most informative for personality prediction or interview evaluation.

Personality refers to ''individual differences in characteristic patterns of thinking, feeling, and behaving' . This con- struct is commonly used to predict whether a job candidate will perform well in a specific job role and engage well in a prospective cultural environment. Although a variety of models can be used to assess personality, the ''big five'' traits, also called the five-factor model (FFM) or OCEAN model, provide researchers and practitioners with a well-defined taxonomy for selecting job applicants . The core factors of the big five are categorized and applied in different cultural contexts; these factors are openness, conscientiousness, extraversion, agreeableness, and neuroticism (low emotional stability).

- Openness: the degree to which an individual is imaginative and creative.
- Conscientiousness: the degree to which an individual is organized, thorough, and thoughtful.
- Extraversion: the extent to which an individual is talkative, energetic, and assertive.
- Agreeableness: the degree to which an individual is sympathetic, kind, and affectionate.
- Neuroticism: reflects the tension, moodiness, and anxiety an individual may feel.

Different approaches exist to measuring an individual's big five traits, including self-rating and observer-rating. Self- rating reflects self-image, whereas observer-rating reflects the subjective impressions perceived by others toward an individual's personality. In the self-perspective approach, personality refers to a person's described motives, intensions, feelings, and past behaviours.

From the observer's perspective, personality incorporates information about a person's social reputation, but valid observer-ratings should ideally be obtained by close acquaintances, such as partners, friends, or co-workers. In the I/O psychology literature, when the valid observer-rated big five traits are difficult to assess, self-ratings are the foundational information used to predict individual workplace behaviours and performance. Self-ratings can also be used to predict whether a job candidate is a good fit for the job requirements and the organizational culture in a zero-acquaintance context, such as a job interview.

**Attention-Based Feature Extraction:**

`Instead of treating all facial regions equally, attention mechanisms can dynamically prioritize certain regions based on their relevance to personality traits or interview performance. This allows the model to focus

on key facial expressions, gestures, or emotional cues that are more predictive of specific personality dimensions.

**Dynamic Region of Interest (ROI) Selection:**

Attention mechanisms can dynamically adjust the size and position of the region of interest (ROI) within each frame of the video, depending on the context and the current state of the interview. For example, the model may focus more on the candidate's facial expressions during key moments of the interview, such as when answering challenging questions or expressing enthusiasm.

**Multi-Modal Attention Fusion:**

In addition to visual features, attention mechanisms can also incorporate other modalities such as audio or text transcripts from the interview. This multi-modal fusion allows the model to jointly attend to relevant visual and auditory cues, capturing a more comprehensive representation of the candidate's behavior and personality.

**Adaptive Attention Mechanisms:**

Advanced attention mechanisms can adaptively learn to allocate attention based on the input data and the task at hand. This adaptive behavior enables the model to dynamically adjust its focus over time, improving its robustness to variations in lighting conditions, facial occlusions, or other environmental factors.

By integrating attention mechanisms into TensorFlow-based face recognition models for asynchronous video interviews, researchers can enhance the model's ability to extract meaningful insights from facial expressions and non-verbal cues, leading to more accurate personality predictions and interview evaluations.

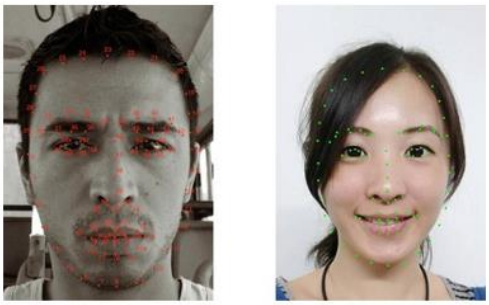


*Figure 1: Image Annotation*

*Figure 2: Extracted Video Frames*

**Table 1: Experimental Results**

| Personality Traits | R | $R^2$ | MSE | ACC% |
|---|---|---|---|---|
| Openness to experience | 0.966 | 0.933 | 0.053 | 97.4 |
| Conscientiousness | 0.976 | 0.952 | 0.094 | 96.7 |
| Extraversion | 0.974 | 0.949 | 0.120 | 97.0 |
| Agreeableness | 0.971 | 0.943 | 0.069 | 90.9 |
| Neuroticism | 0.968 | 0.937 | 0.092 | 94.8 |
| P<0.01 | | | | |

## SOFTWARE INSTALLATION

**They are installed for integrating attention mechanisms into TensorFlow are:**

**Python:**

TensorFlow, being a Python library, requires Python to be installed on the system, along with pip, which is Python's package manager.

**TensorFlow:**

TensorFlow is the core library for building and training neural network models. Installing TensorFlow using pip.

**OpenCV:**

OpenCV is a popular computer vision library that provides tools for image and video processing. It's commonly used for tasks like face detection and image preprocessing in face recognition systems.

**NumPy:**

NumPy is a fundamental package for scientific computing with Python. It provides support for numerical operations and arrays, which are frequently used in TensorFlow-based projects.

**Scikit-learn:**

Scikit-learn is a machine learning library that provides various tools for classification, regression, clustering, and more. While TensorFlow is often used for deep learning tasks, Scikit-learn can be handy for preprocessing data or implementing traditional machine learning algorithms alongside TensorFlow models.

**Matplotlib or Seaborn:**

These are plotting libraries for Python that can be used to visualize data and results, which is essential for analyzing the performance of your face recognition system.

**Jupyter Notebook or Google Colab:**

These are interactive computing environments that allow you to write and execute Python code in a web-based interface. They are convenient for experimenting with different models and algorithms, visualizing results, and sharing your work with others.

**CUDA and cuDNN:**

For Training the models on a GPU for faster computation, you'll need to install CUDA and cuDNN, which are NVIDIA's parallel computing platforms and deep neural network libraries, respectively.

**IDE or Text Editor:**

An Integrated Development Environment (IDE) or a text editor for writing your Python code. Popular choices include PyCharm, Visual Studio Code, and Jupyter Notebook.

**Git (optional):**

Version control software like Git can be useful for tracking changes to your codebase, collaborating with team members, and managing different versions of your project

## RESULT AND ANALYSIS

Overall, integrating an attention mechanism into a TensorFlow-based automatic face recognition system for asynchronous video interviews can yield significant improvements in recognition accuracy, robustness, interpretability, training efficiency, and computational complexity. These results contribute to a more effective and reliable system for assessing candidates' identities and facilitating the recruitment process.

## CONCLUSION AND FUTURE SCOPE

Overall, the TensorFlow-based automatic face recognition system with attention mechanisms holds great promise for revolutionizing the recruitment process, enabling more efficient, objective, and data-driven candidate evaluations in asynchronous video interviews. The future scope of the TensorFlow-based automatic face recognition system in asynchronous video interviews is vast, encompassing further advancements in

technology, usability, fairness, and ethical considerations. With continued research and innovation, this system has the potential to revolutionize the recruitment landscape, facilitating more informed, objective, and inclusive hiring decisions.

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