TRENDS IN PERSONALITY ASSESSMENT WITH THE ADVENT OF ARTIFICIAL INTELLIGENCE

Abstract

Personality indicates behavioural, thinking and emotional styles unique to each individual that determines their peculiar reactions to the situation. While evaluating personality, both the person and situation are influential in determining pattern of person's behaviour and this interrelated pattern provides an insight into the consistent tendencies across situations. Traditional approach of personality assessment involves test administration and manual scoring by trained professionals. However, with the advancement of technology, computer assisted approaches have been included in the testing procedures for the ease of administration making it more efficient and user friendly. The abundant digital data poses numerous opportunities for researchers to leverage inherent machine learning potential in order to develop valid and reliable methodologies and AI tools could be utilized to enhance personality assessment procedures. The introduction of potential AI modules in personality assessment needs to be complementary to the human expertise in the area. The current chapter focuses on the scope of AI tools in evaluating personality with its applicability in various domains.

Keywords: Personality, Artificial Intelligence, Machine learning, Assessment.

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I. INTRODUCTION

Psychologists have known to be studying human behaviour to achieve four fundamental goals: to describe, explain, predict and modify behaviour. From time immemorial, researchers and theorists have been motivated to build upon a variety of theories in order to obtain insights into the subtleties of human behaviour and to understand individual differences. Parallel to the philosophical foundations of psychology, the study of personality began long ago with the classification of body types and bile in order to assess how similar people were. However, as personality psychology developed into a separate field, the early theories were found to be ancillary and overly simplistic. The work of Gordon Allport, who defined personality as "the dynamic organization within the individual of those psychophysical systems that determine his characteristic behaviour and thought" (Allport, 1961) [1], was largely responsible for the study of personality psychology to become formalized and systematic in the 1930s. Personality indicates behavioural, thinking and emotional styles unique to each individual that determines their peculiar reactions to the situation. While evaluating personality, both the person and situation are influential in determining pattern of person's behaviour and this interrelated pattern provides an insight into the consistent tendencies across situations. Personality also influences one's perceptual style, social adjustments, values and attitudes.

Allport emphasised two major methodologies to study personality i.e., nomothetic (generalized laws applicable to many people) and idiographic approaches (unique aspects of an individual). The study of personality has long standing theoretical history and the major perspectives include psychodynamic, trait, behaviouristic, evolutionary and social learning perspective. The early writings of Sir Francis Galton, where he states that "the character that shapes our conduct is definite and durable 'something' and therefore... it is reasonable to attempt to measure it," are where the inclination towards scientific measurements and psychometric developments can be found [2]. The personality researches were empirically driven (factor analysis) and also emphasised on theory development (psychodynamic theory). As soon as, a construct becomes relevant, researchers initiate systematic studies in order to accurately define and to measure it. Additionally, the socio-cultural background of academic and scientific developments is always of significance, thus the context is always relevant. Similarly, the significance of measurement in personality psychology also increased as a result of Binet's prestige and his intelligence tests.

II. TRADITIONAL APPROACHES/ROOTS OF PERSONALITY PSYCHOLOGY

It is challenging to sum up a person's personality in a concise manner since humans are too complex and dynamic in different situations and around different people. Nevertheless, psychologists have worked towards developing a comprehensive understanding of personality and with each of their theories they try and fit in their piece to the grand puzzle and continue to bring forth a clearer image; a more complete picture of what makes us the way we are and determines how we look at the world around us. Hence, the ideas and theories of various psychologists and scientists have advanced towards explaining human personality. It is also imperative to note that any researcher's ideologies and perceptions are strongly influenced by their own experiences, personalities, and the temporal significance of their respective academic works. With Freud's efforts to comprehend the issues of his patients, the psychoanalytic approach concentrated on the study of unconscious, factors that shape one's personality, his ideas was primarily grounded in biologically based intra-psychic

occurrences. Following then, other methodologies appeared to offer perspectives on the study of personality, namely, behaviouristic approach, which focused primarily on overt behaviour and reduced personality to what can be seen and observed objectively. Formal beginning of the study of personality psychology is marked by the work of Gordon Allport in his book: 'Personality: A psychological interpretation' [3]. His work emphasised that traits are distinct part of each individual and are relatively permanent reaction tendencies that are basic structural units of the personality. The trait approach (contends that much of our personality is inherited) was further advanced by the academic work of various theorists, mainly Raymond Cattell, Hans Eysenck and Henry Murray. Thereafter, the field of modern personality psychology grew exponentially wherein various approaches made significant impact wherein life span approach argues that personality continues to develop throughput the course of our life; humanistic approach emphasises on human strengths and virtues and fulfilment of our potential; cognitive approach deals with conscious mental activities [4]. One's personality also shapes their experiences and the way an individual pursues their goals, their expectations for the future and accomplishments, even their health, are all significantly influenced by their personality and the personalities of those around them and hence, it is crucial to be able to measure and understand all its aspect.

III. SCOPE OF ASSESSMENT OF PERSONALITY

Traditionally, personality assessments were conducted using paper and pencil tests akin to how intelligence tests were administered. However, as the field expanded, personality tests broadly ranged from objective tests (self reports, multiple choice questionnaires) to projective tests (interpretation of ambiguous stimuli) and behavioural indicators (observational data and other types of ratings) were also inclusive as a component of evaluation.

The assessment of personality in various fields is a major area of application of psychology to the real world concerns. Different fields address issues and concerns specific to the area and sample under study. For instance, clinical psychologists evaluate person's personality to distinguish between normal and abnormal behaviour in order to develop better understanding of presenting symptoms and to accurately diagnose to devise the appropriate course of treatment. Counselling psychologists measure personality to meet the requirements of the client and to equip them to handle life demands effectively, concurrent with their interest and needs. School psychologists assess students in an effort to identify the root cause of behavioural issues or academic difficulties or to curate career profile based on their interest and aptitude. Industrial/organizational psychologist assesses personality to determine job-person fit and to enhance organization efficiency by improving human capital (e.g., tailor-made training modules to suit individual as well as organizational requirements). Research psychologists study data to continue to evolve theories and methodologies to determine various aspects of personality to gain better insights and application based advancements [4].

In psychological testing, standardised tools are often used with an emphasis on quantitative outcomes to quantify particular qualities, traits and tendencies. Additionally, psychological assessment is a more comprehensive procedure that includes a variety of techniques, such as tests, interviews, and observations and concludes with an exhaustive interpretation by an expert. It seeks to offer a thorough insight into a person's psychological state and hence requires interpretation from a trained professional. The decision between testing and assessment is based on the objectives, the requisite level of comprehension, and

the evaluation resources available (Table 1). Moreover, with the advancement of technology we can anticipate excellent opportunities to improve personality testing mainly with respect to nuanced and expeditious evaluations.

Table 1: Difference between Psychological Testing and Assessment

S. No	Aspect	Testing	Assessment
1.	Purpose	Specific measurement of psychological construct	Broader evaluation of an individual's psychological state
2.	Focus	Targets specific trait or behaviour	Involves holistic understanding of an individual
3.	Methods	Utilizes standardised tests and questionnaires	Involves various methods inclusive of tests, interviews etc
4.	Scope	Typically evaluates a specific trait or disorder	Encompasses multiple traits, disorders and profiling.
5.	Structure	Predetermined set of questions/tasks	Adapts to the individual needs and assessment goal requirements
6.	Time	Generally short and more focussed	Can be longer and may require multiple sessions
7.	Administration	Can be administered by non expert with the aid of manuals	Needs a trained professional and expert
8.	Example	IQ tests, Personality Inventories	Clinical assessments, neuropsychological evaluations
9.	Flexibility	Limited in adapting to individual need	Can be tailored to the unique needs of an individual
10.	Interpretation	Often straight forward, score based interpretation	Nuanced and detailed interpretation by an expert.

IV. SCOPE OF ARTIFICIAL INTELLIGENCE IN PERSONALITY ASSESSMENT

The advancement of technology with the advent of Artificial Intelligence (AI) unfolds greater opportunities and research avenues especially for the field of Personality Psychology. Since, AI tools have an inherited advantage to perpetually evolve via machine learning, they can accomplish jobs at much higher speeds, scales, and levels of accuracy than humans; they have an edge over traditional methods due to their data processing capabilities. However, AI personality assessments being relatively new methodologies have its own set of drawbacks, such as data bias, privacy issues and validity concerns. On the contrary, traditional approaches have a solid theoretical and psychometric foundation (Table 2). The idea is to leverage the potential of machine learning to benefit the goals of personality psychology and to merge its advantage with theoretical framework in order to surpass its shortcomings. The testing administration has already evolved with the facilitation of computer assisted approach as presently most of the paper-pencil tests are available online. Additionally, computer adaptive testing [5] is an advanced version of test administration wherein the machine regulates the succession of questions/stimulus based on the test-takers' ability. Such kind of a testing depends largely on the pre-fed database and algorithms; hence it requires an

exhaustive database to function precisely and effectively. The accuracy of the output, in this case the personality assessment of the test-taker, depends on the accuracy of the inputs and machine algorithms.

Table 2: Comparison between Traditional and AI-Assisted approaches of Personality Assessment

	Traditional Personality Assessment	AI Personality Assessment
Methodology	Relies on self-report questionnaires, interviews, and observations.	Utilizes machine learning algorithms to analyze digital data.
Data Collection	Requires participants to respond to standardized stimulus	Analyzes digital footprints like social media posts, texts, etc.
Scope	Limited by the number of questions and their design.	Can process vast amounts of data for a more nuanced view.
Bias	Susceptible to response bias and social desirability bias.	Can inherit biases present in the training data and due diligence is requisite during algorithm designs.
Efficiency	Time-consuming due to manual administration and scoring.	Rapid processing allows for quick assessment.
Depth of Analysis	Offers insights into specific traits and behaviours under study.	Can provide detailed analysis of various personality aspects by analyzing subtle patterns.
Cost Efficiency	May involve costs for printing, distribution, and human raters.	Initial development cost for AI, but lower per-assessment cost.
Adaptability	Difficult to adapt to changes or update questionnaires	Can be updated with new data and evolving understanding with its machine learning feature
Ethical/Privacy Concerns	Requires sharing personal information with assessors with prior consent and ethical considerations.	Analyzes existing digital data, raising privacy considerations. Due deliberation by researchers is imperative.
Human Involvement	Primarily relies on human expertise for interpretation.	Automates the analysis based on individual inputs, reducing the need for human involvement.
Insights on traits	May struggle to assess latent/contradictory traits and confounding variables but offers insights rooted in psychological theories and research.	Can identify subtle patterns and relationships in the data if supported by the algorithms and derives insights based on patterns in data, might lack theory grounding.

Today, researchers have access to a vast amount of data owing to the rapidly developing field of technology and the integration of artificial intelligence into every aspect of our everyday lives. A growing proportion of human activities, such as social interactions, entertainment, shopping, and gathering information, are now mediated by digital services and

devices. Such digitally mediated behaviours can easily be recorded and analyzed, fuelling the emergence of computational social science and new services such as personalized search engines, recommender systems, and targeted online marketing. A wide variety of personal traits can be inferred from an individual's digital records (Kosinski, Stillwell & Graepel) [6]. With everyone spending more time online and leaving digital imprints, it becomes easy to predict individual tendencies and personality traits by examining these digital traces. The computational social psychologist Michael Kosinski emphasizes that computers are considerably better than humans at predicting personality traits [8]. Kosinski states that computers have a couple of key advantages over human beings in the area of personality analysis. Above all, they can retain and access large quantities of information, and analyze all this data through algorithms. This provides the accuracy that the human mind has a hard time achieving due to a human tendency to give too much weight to one or two examples or to lapse into non-rational ways of thinking, the researchers wrote. However, the widespread availability of extensive records of individual behavior, together with the desire to learn more about customers and citizens, presents serious challenges related to privacy and data ownership. Kosinski emphasised the immense potential that machine learning has, 'that in future, computers could be able to infer and psychological trait and react accordingly, leading to the emergence of emotionally intelligent and socially skilled machines'. Predicting individual traits and attributes based on various cues, such as samples of written text, answers to a psychometric test, or the appearance of spaces people inhabit has a long history. Human migration to digital environment renders it possible to base such predictions on digital records of human behavior. Youyou, Kosinski and Stillwell [7] with their academic work emphasised that the easily accessible digital records of behavior, Facebook Likes, can be used to automatically and accurately predict a range of highly sensitive personal attributes including: sexual orientation, ethnicity, religious and political views, personality traits, intelligence, happiness, use of addictive substances, parental separation, age, and gender. The analysis presented was based on a dataset of over 58,000 volunteers who provided their Facebook Likes, detailed demographic profiles, and the results of several psychometric tests (Kosinski, Stillwell & Graepel) [6]. Moreover, the wide variety of attributes predicted in this study indicates that, given appropriate training data, it may be possible to reveal other attributes as well. Such predictability of individual traits from digital records of behaviour opens up avenues to devise reliable and valid methodology to evaluate individuals based on the requirement of specific setting. For example, such modalities would ease the selection procedure in an organizational setting ensuring job person fit. Additionally, inference based on observations of digitally recorded behaviour may open new research avenues. On the contrary, there is a risk that the growing awareness of digital exposure may negatively affect people's experience of digital technologies, decrease their trust in online services, or even completely deter them from using digital technology.

The academic work of Pennebaker, Mehl, and Niederhoffer [8] highlights how computer-based text analysis enables researchers to accurately and quickly evaluate features of what people say as well as subtleties in their linguistic styles. This evidence links natural word use to personality, social and situational fluctuations that can serve as markers of emotional state, social identity, and cognitive styles. Theoretical underpinnings of text analysis and its relevance with personality could be seen in the psychodynamic approach wherein written responses to ambiguous stimuli were analyzed to gauge latent needs and drives. Pennebaker and his colleagues investigated how emotional writings improved an individual's physical health and how the use of specific words and pronouns revealed a lot about an individual's emotional states. The computer software (Linguistic Inquiry and Word

Count) [9] developed by Pennebaker and his colleagues was programmed to count words in psychologically meaningful categories. Empirical results using LIWC demonstrate its ability to detect meaning in a wide variety of experimental settings, including emotionality, social relationships, thinking styles, and individual differences. LIWC akin to any other machine dependent analysis relies heavily on the database and algorithm fed to the system from which it derives correlations; however, its disadvantage lies in its limitation to factor in the contextual relevance while analyzing the textual words. As the usage of any particular word varies in its meaning depending on the context; the context can change the meaning of the word completely and in such a case analyzing the word's meaning in its literal form may lead to erroneous evaluation and conclusions and human intervention may be required.

Stachl, et al studied [10] machine learning in personality assessment and emphasised the challenges that researchers face when building, interpreting, and validating machine learning models. They also discussed the evaluation of personality scales, derived using machine learning methods and highlighted some key issues related to the use of latent variables in the modeling process. According to Bleidorn and Hopwood [11] the use of machine learning to create personality assessment tools may eventually displace traditional test development technologies for a wide range of applications. If the development of these tools takes place inside a construct validation framework that connects the empirical processes of test production with personality theory, this technology will be more effective. Machine learning can evolve into a potent tool for both behaviour prediction and creating new insights into the nature of personality with more careful consideration given to all areas of the construct validation process. When it comes to AI tools, the predictive validity is considered to be better but construct validity needs to be worked upon to filter out data relevant to the aim of the study. Personality psychologists can leverage the multi-modal approach (simultaneously evaluate data from various sources) of artificial intelligence to enhance the accuracy and objectivity of assessments across different fields of application. The AI-assisted evaluation could be more useful in the following domains:-

1. **Clinical Setting:** In clinical contexts, the application of AI algorithms could aid in the diagnosis, monitoring, and treatment of medical disorders. AI could also be used to analyze personality traits and features that may be significant for diagnosis and treatment of mental health illnesses.

   - **Natural Language Processing (NLP):** AI can analyze text to find patterns in language use, sentiment, and emotional tone, such as patients' written or spoken comments during treatment sessions. This data can assist clinicians in understanding a patient's emotional state and personality attributes.

   - **Virtual Mental Health Assistants:** AI-powered chat-bots or virtual assistants can converse with patients, gathering data on their feelings, thoughts, and behaviours. These interactions can further reveal information about personality attributes and mental health.

   - **Behavioural Analysis:** During tele-health or in-person consultations, AI can study facial expressions, gestures, and voice signals to infer emotional states and personality traits which would facilitate advantageous experience for the user.

2. **Research Setting:** AI-assisted evaluation could aid in data processing, hypothesis creation, and knowledge discovery in research settings.

- **Data Mining and Analysis:** AI can analyze enormous datasets simultaneously, such as social media posts, online activities, and survey results, to uncover correlations between language use, behavior, and specific personality traits.

- **Personality Profiling:** By recognizing patterns in numerous data sources, AI systems may construct detailed personality profiles, supporting theoretical underpinnings in understanding how different traits manifest in different circumstances.

- **Prediction and Modelling:** AI could create prediction models that link specific language patterns or actions to specific personality traits, allowing academicians to better understand the relationship between linguistic style and behavior.

3. **Organizational Settings:** AI can improve hiring, team dynamics, and employee development by using personality assessments in organizational settings.

- **Automated Screening:** To determine whether an applicant's personality attributes match the organization's values and job needs, AI technologies can examine the applicant's web presence, resume, and questionnaire answers. Additionally, job-person fit can be determined by evaluating an individual via tailor-made personality assessment modules based on job analysis. Considering personality attributes during selection procedure, employee can be allotted to tasks/teams which support his/her abilities thus, improving organizational efficiency.

- **Improved Job Satisfaction and Employee Engagement:** AI-powered surveys may evaluate employee opinions and personality-related traits to allow the firms to better customize initiatives for improved job satisfaction and employee engagement.

- **Personalized Development:** Based on an employee's personality qualities and potential for growth, AI can suggest customized training and development plans to optimize human capital.

  In all these applications, wherein the AI-assisted procedures could facilitate researchers with the abundance of data, it's also important to note ethical concerns related to privacy, bias, and transparency. Moreover, while AI can offer valuable insights into personality traits, the complexity and depth of human personalities cannot be fully captured by algorithms alone, hence, AI should be seen as a complementary tool rather than as a replacement for human expertise.

V. CONCLUSION

The burgeoning digital migration and integration of technology in each aspect of our everyday life viz a viz, social media, marketing, academic and entertainment leaves enough digital footprints for the researches to deduce the individual pattern. Our everyday online experiences are individually curated based on our online behaviour and our perceptual styles. Such an intersection provides potential for developing greater insights into the study of

personality, as AI has an advantage over traditional assessment with respect to data analysis capabilities. The inherit advantage of machine over humans in simultaneously processing abundant data from various sources gives it an edge over traditional data processing. Some methods are duly researched when it comes to AI assisted personality assessment such as language processing software which derives individual tendencies from linguistic style.

Additionally, social media pattern and its relevance with the personality profiling of an individual based on the likes and dislikes could provide a better prediction of an individual personality. Researchers also claim that owing to the adaptive nature of machine learning, computers also have a potential to develop empathetic reactive quality which could be advantageous in developing future intervention modules especially in personality domain. However, such modalities need to be developed judiciously to overcome the drawbacks of validity and data privacy concerns. The predictive validity could be better for AI approaches but construct validity requires human intervention while developing input output algorithms. However, such approaches are majorly dependent on the manifested aspect of the personality and to some extent overlook the subtleties and interplay of latent traits. Nevertheless, machine learning has great adaptability and could enhance its pattern recognition based on the algorithm betterment if provided. Hence human expertise cannot be replaced but AI needs to be taken as complementary tools for further study in personality assessment. Knowledge of these methodologies will pave the way for the successful adoption of machine learning models in the field of psychological research, leading to a greater understanding of personality.

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