

Lecture Notes in Networks and Systems 1085

Abhishek Swaroop

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Aboul Ella Hassanien *Editors*

Proceedings of Fifth Doctoral Symposium on Computational Intelligence

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DoSCI 2024, Volume 4

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*Prof. (Dr.) Vineet Kansal would like to
dedicate this book to his father
Sh. Vinod Kumar and his mother
Late (Smt.) Usha Gupta.*

*Prof. (Dr.) Aboul Ella Hassanien would
like to dedicate this book to his wife
Nazaha Hassan.*

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Preface

We hereby are delighted to announce that Institute of Engineering and Technology, a constituent college of Dr. A. P. J. Abdul Kalam Technical University Lucknow, India, in association with School of Open Learning, University of Delhi, and University of Calabria, Italy, has hosted the eagerly awaited and much coveted Doctoral Symposium on Computational Intelligence (DoSCI-2024)—An International Conference in Hybrid Mode. The fifth version of the symposium was able to attract a diverse range of engineering practitioners, academicians, scholars, and industry delegates, with the reception of more than 1000 papers from different parts of the world. The committee of professionals dedicated towards the symposium is striving to achieve a high-quality technical program with track on computational intelligence. Therefore, a lot of research is happening in the above-mentioned track and its related sub-areas. More than 1000 full-length papers have been received, among which the contributions are focused on theoretical, computer simulation-based research, and laboratory-scale experiments. Amongst these manuscripts, 187 papers have been included in the Springer proceedings after a thorough two-stage review and editing process. All the manuscripts submitted to the DoSCI-2024 were peer-reviewed by at least two independent reviewers, who were provided with a detailed review pro forma. The comments from the reviewers were communicated to the authors, who incorporated the suggestions in their revised manuscripts. The recommendations from two reviewers were taken into consideration while selecting a manuscript for inclusion in the proceedings. The exhaustiveness of the review process is evident, given the large number of articles received addressing a wide range of research areas. The stringent review process ensured that each published manuscript met the rigorous academic and scientific standards. It is an exalting experience to finally see these elite contributions materialize into a book volume as DoSCI-2024 proceedings by Springer entitled “Doctoral Symposium on Computational Intelligence”.

DoSCI-2024 invited three keynote speakers, who are eminent researchers in the field of computer science and engineering, from different parts of the world. In addition to the plenary sessions on the day of the symposium, fifteen concurrent technical sessions are held on the day to assure the oral presentation of around 187 accepted papers. Keynote speakers and session chair(s) for each of the concurrent

sessions have been leading researchers from the thematic area of the session. A technical exhibition is held during all the day of the symposium, which has put on display the latest technologies, expositions, ideas, and presentations. The research part of the symposium was organized in a total of 09 special sessions. These special sessions provided the opportunity for researchers conducting research in specific areas to present their results in a more focused environment.

An international symposium of such magnitude and release of the DoSCI-2024 proceedings by Springer has been the remarkable outcome of the untiring efforts of the entire organizing team. The success of an event undoubtedly involves the painstaking efforts of several contributors at different stages, dictated by their devotion and sincerity. Fortunately, since the beginning of its journey, DoSCI-2024 has received support and contributions from every corner. We thank them all who have wished the best for DoSCI-2024 and contributed by any means towards its success. The edited proceedings volume by Springer would not have been possible without the perseverance of all the steering, advisory, and technical program committee members.

All the contributing authors owe thanks to the organizers of DoSCI-2024 for their interest and exceptional articles. We would also like to thank the authors of the papers for adhering to the time schedule and for incorporating the review comments. We wish to extend my heartfelt acknowledgment to the authors, peer reviewers, committee members, and production staff whose diligent work put shape to the DoSCI-2024 proceedings. We especially want to thank our dedicated team of peer reviewers who volunteered for the arduous and tedious step of quality checking and critique on the submitted manuscripts. The management, faculties, administrative, and support staff of the college have always been extending their services whenever needed, for which we remain thankful to them.

Lastly, we would like to thank Springer for accepting our proposal for publishing the DoSCI-2024 symposium proceedings. Help received from Mr. Aninda Bose, the acquisition senior editor, in the process has been very useful.

New Delhi, India

Abhishek Swaroop
Symposium Chair, DoSCI-2024

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A Comprehensive Examination of Machine Learning Models in Predicting 16 Personality Traits



Aroma Khan, Harshit Maneria, Ashish Kumar, Preeti Garg, and Rohit Vashisth

Abstract This study applies several kinds of machine learning frameworks to predict personality traits according to the Myers-Briggs Type Indicator (MBTI). The dataset used in this study includes demographic data as well as self-identification information. Prior analysis, the dataset underwent processing to convert categorical characteristics, such as gender, into numerical representations. To solve the multinomial classification test, multinomial logistic regression was used, incorporating variables such as age, gender, and recall scores derived from the 16 MBTI personality traits. Model training includes tweaking parameters while running the Newton-CG solver to enhance accuracy and convergence. The model's efficacy was assessed utilizing testing data from demographic data providers and also the MBTI 16 personality traits. The core objective of this study is to estimate individual traits while presenting the outcome in a way that is understandable. The study's findings demonstrate the effectiveness of logistic regression used with the MBTI's 16 personality types in accurately predicting personality attributes.

Keywords Machine learning · Personality traits · LightGBM · Accuracy · Recall · Random forest

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1 Introduction

It is a common practice to determine someone's personality based on their nature. These were formerly completed manually, which took a long time to determine the person's personality. Businesses that prioritize their customers, including those in retail, finance, communications, and marketing, are the ones who employ data mining the most frequently these days. The data was analyzed using a variety of methods, including surveys, questionnaires, interviews, classroom exercises, and data from social media networks and retail websites on user experiences and challenges. On the other hand, traditional methods are scale- and time-limited. The user's personality will be made clear by our suggested technology. Determining an individual's nature to determine their personality is not a novel concept. The way a person interacts with the outside world and their environment can also be influenced by their personality. Among other things, personality may be utilized as a differentiator in career counseling, health counseling, and hiring processes. It's common practice to analyze a person's behavior to infer their personality. It required a lot of time and work to forecast personalities manually [1].

No personality type is "better" or "best" than any other. Some of the personality types are explained here.

- A. *Introversion (I) and Extraversion (E)*—The extraversion-introversion dichotomy explains human behavior and interactions with the outside world. In contrast to introverts, who value thoughtful conversations, feel refreshed after spending time alone, and enjoy in-depth, meaningful dialogues, Extroverts enjoy frequent social interactions, are goal-oriented, and experience a boost in energy after interacting with others. All of us display some extraversion or introversion, although most individuals lean more toward one or the other overall.
- B. *Sensing (S)–Intuition (N)*—Individuals spend time feeling and intuiting depending on the environment, much like extroverts and introverts do. While individuals who value intuition pay attention to perceptions and patterns, those who value sensing concentrate on reality and get knowledge from their senses. Those who favor sensing concentrate on facts and practical experiences, whereas they like to imagine possibilities and abstract ideas.
- C. *Thinking (T)–Intuition (N)*—Reasoning people are more likely to regard facts and unbiased information. When making a choice, they are usually dispassionate, rational, and consistent. When making decisions, those who value feeling are more inclined to take other people and their feelings into account.
- D. *Judging (J)–Perceiving (P)*—Judging-inclined people like structure and decisive outcomes. Individuals with a tendency for perception are more receptive, adaptive, and flexible. The other scales are impacted by these two inclinations.

With a focus on employing a LightGBM since it performs better than the other three models—random forest, Multinomial Naive Bayes, and logistic regression—this study examines the possible uses of machine learning to personality prediction models. The model uses a collection of retrieved relevant parameters to predict