A DATA-DRIVEN ARTIFICIAL INTELLIGENCE FRAMEWORK FOR HIGH-DIMENSIONAL FEATURE LEARNING AND PREDICTIVE MODELING

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ABSTRACT:
All spheres of the healthcare sector, finances, and social media are rapidly growing in terms of high-dimensional data and require robust schemes of useful features extraction and effective predictors modeling. The research article focuses on a data-driven artificial intelligence (AI) model that is capable of dealing with high-dimensional feature space and improve interpretability of a model and prediction accuracy. The architecture is a combination of state-of-art methods of dimensionality reduction, features selection algorithms, and deep learning architecture that learns non-linear and complicated relationships in big data. Broad based experimentations with benchmark data show that, the suggested framework outdoes the traditional frameworks in terms of predictive accuracy, processing speed and scalability. The framework also provides information about the contribution brought by each specific feature to make decision easier and have a conception of its territory. The high dimensional analysis can also develop the AI derived in this work offering the realistic approach to be applied in the actual applicability of prediction modeling and revealing knowledge in the real life.

Keywords: High-dimensional data, Feature learning, Predictive modeling, Artificial intelligence, Dimensionality reduction, Deep learning, Feature selection

I. INTRODUCTION

The advent of the big data in the contemporary society has altered the essential way this knowledge is developed, examined and applied in many sectors including medicinal, finances, advertising, social media and even scientific research. Multidimensional data with numerous features or variables or variables is growing in strength and also stands as a possibility of identifying patterns and relationships previously unnoticed and that which could not be accomplished through the past limited dimensional data. However, the fact of the large numbers of features of modern datasets entails tremendous threats to the process of data analysis due to the high probability of redundant, irrelevant or even noise data to undermine the work of predictive models which can result in overfitting, poor interpretability and even complicated computations. It has resulted in the development of high-quality and scalable frameworks that would be capable of handling high-dimensional data becoming an essential discipline in artificial intelligence (AI) and machine learning disciplines.

The traditional statistical and machine learning frameworks of linear regression, decision trees, and support vectors machines are usually unusable in the presence of dimensionality challenges and more advanced algorithms must be used to weed out and decompose features and take dimensionality learning

features. The latest advancement of AI and more specifically in the field of deep learning as well as ensemble algorithms as have shown the potentially encouraging capabilities of representing non-linear associations, acquiring hierarchical properties, and a great deal of forecasting performance even in the high dimension scenario with high complexity. Regardless of the exigence of these developments, a research gap remains in the form of a comprehensive, data-driven, framework of integrating high-dimensional feature learning with predictive modeling which limits the implementation AI to practical use in large-scale datasets.

This paper aims to address this into an efficient AI architecture, which would employ the most recent designs of feature detection, dimensionality reduction, and deep learning designs in order to create precise, cost effective, and understandable prediction modeling in high dimensional contexts. The proposed structure will function by first identifying the most informative attributes using methods of the new feature selection programs to result in lower levels of redundancy and the improved elucidation of the model. This is then succeeded by dimensionality reduction models, such as principal component analysis, autoencoders and manifold learning, which cannot reduce the original high-dimensional feature space to a small high-meaning representation, and that critical information is preserved. These acquired properties are subsequently applied in forecasting activities usually with deep learning network or ensemble or hybrid designs to yield profound, non-linear interrelations and improve the overall predictive power.

This allows the application of the framework to a large variety of fields of data and problems since the framework is data-driven and is applicable to researchers and practitioners. In addition to this, the framework has model evaluation and interpretability measures such that, the obtained predictive models are accurate but can be employed to reveal the relative significance of the particular features and their role in the prediction, which can be particularly applicable in such fields as healthcare, finance, and policymaking. The efficiency of the proposed framework can be explained by the presence of vast testing on benchmark datasets which revealed the efficacy of the framework to be superior in terms of prediction quality, computation efficiency and scalability compared to the conventional approaches. Combining the concerns of high-dimensional data representation and guaranteeing at the same time the explainable AI output, the given research may be viewed as the complement to the existing body of knowledge regarding the intelligent data-driven practices and offer an incentive to the future studies that aim to integrate AI practices with the domain-specific knowledge to make superior decisions.

Conclusively, the increasing complexity of high-dimensional data sets would suggest the necessity of novel AI structures, which can not only train a representation of features, but also make accurate predictions concurrently, and be interpretable. The proposed data-driven AI design is a valuable move in that direction as it offers a high-dimensional features learning predictive modeling systematic and scalable framework to bridge the gap between theoretical offerings of AI and its actual application to a wide range of areas.

II. LITERATURE REVIEW

The scientific field of psychology health promotion has also attracted momentum attention over the last few years, in the effort to improve mental health and performance of students among other populations. Xu (2022) explored the relationship between psychological quality education and the mental health level among college students and that the properly organized educational interventions might help to increase the psychological resilience of students and evolve their coping strategies. Similarly, a College Student Mental Health Education Course (CSMHEC) as a compartment of the

undergraduate medical curriculum was implemented, and Wang and Du (2020) proved that formalized psychological health education can be effectively used to reduce stress and anxiety and enhance academic results.

Moreover, to the general education, particular interventions containing the combination of psychological support and health education were also proven useful in certain populations. As mentioned above, individualized mental health interventions were found to have a positive impact on the outcomes of the pregnancy in case of women with gestational diabetes mellitus, thus individualized mental health intervention appeared to be beneficial (He et al., 2022). According to Sun et al. (2021), the combination of psychological nursing and health education in patients with lung cancer contributed to the decrease in the incidence of depression and anxiety and the holistic increase in the quality of life, which supports the further extrapolation of the given types of procedures to patients in diverse age groups and clinical conditions.

The new technology has posed new modes of delivering psychological health education. To provide an example, AI-mediated smartphone-based intervention on self-care was shown to have the potential of reducing psychological distress in university students (ACTRN12621001223820, 2021). Gan and Gao (2017) have also stated that mobile media application has been found to be a good strategy in enabling students to be more mindfulness and engaged. These findings emphasize the fact that digital interventions can be potentially applied to complement traditional education methods and interactive more masses of the population.

It has been suggested that wholesome growth of students can be promoted by incorporating ideology, political and mental health education. Ding (2021) postulates that ideological education also needs to be integrated with the mental health curriculum which would impact on moral and psychological maturity, and thus promote resilience and social responsibility. Further, the idea of psychological capital that is also brought out by Wang et al. (2014) and considered as the model of managing mental health education in the public schools demonstrates that the promotion of self-efficacy, optimism, hope, and resilience can prove to be the long-term benefit to the psychological maturation of students.

The psychological health education uses in stress coping and organization have also been addressed. Yajun (2023) moved the British norms of coping with stress to the post-epidemic context and this might also underlie the introduction of the effective training of psychology and resilience development. In a study on the impacts of employee stress on the cost of technology management, Zhang et al. detected that the psychological education can indirectly contribute to the efficient work of the organization and the reduction of its risks (2021).

There are also new pedagogical strategies and educational technologies which have also contributed towards the area. Wu (2018) analyzes the notion of psychological health education within the context of the positive psychology, thereby, making it entirely evident that people need to concentrate on amplifying the positive psychological properties, as opposed to dwelling on the limitations. Andrews (2011) highlighted on application of serious games as a novel approach of teaching psychological health in order to equip the learners with the interactive and stimulating learning activities. As a threat to the mental health education of college students, Zhu (2017) offered the network environment and suggested adaptive methods of seeing them. According to Panqiu and Li (2020), the application of big data to create individual psychological health education and have more specific and effective intervention is suggested. Finally, Zhang and Zhang (2020) demonstrated that so-called positive psychological traits which are enhanced through behavioral recommendations and psychological health education could be

enhanced through practical action-oriented advice given to students in addition to theoretical training.

To put it in short, the examined sources are in agreement in indicating the multidimensional health benefits of psychological health education insofar as the population, mode, and delivery mechanism. Carefully planned programs not only lead to Jiangshi (mental health) but also to school outcomes, strength and life quality. Digital interventions, big data analytics, and tailored methods are all tendencies that can be considered a new face of scalable and adaptable strategies of mentality education. However, despite this tremendous gain, it is apparent that integrative strategies that combine the learning content, technological interventions and customized solutions are needed to be on the max in their effects on the citizens of other groups and other contexts.

Objectives of the study

1. To examine the relationship between psychological health education and mental well-being of students.
2. To evaluate the effectiveness of personalized psychological interventions combined with health education.
3. To assess the impact of technology-based tools on delivering psychological health education.

Hypothesis (H_1): Personalized psychological interventions combined with health education significantly improve the mental health outcomes and well-being of participants compared to standard or no interventions.

Null Hypothesis (H_0): Personalized psychological interventions combined with health education do not have a significant effect on the mental health outcomes and well-being of participants compared to standard or no interventions.

III. RESEARCH METHODOLOGY

The given research is quantitative research to determine the impact of application of individualized psychological interventions as well as health education. The study design is a descriptive and experimental study where the final outcome of the research is quantified by the pre- and post-intervention in measuring the mental health outcomes of the subjects under study. The targeted group would comprise of college students within an under graduate program, where purposive selection will be used since the respondents to be used in the study shall be qualified to fit the inclusion criterion on the basis of age, academic level and readiness to respond. Data collection is performed using standardized tools of psychological testing like validated scales of depression, anxiety, stress, and psychological well-being and the analysis of the same with the help of structured questionnaires to determine the perception of the participants regarding the intervention. The intervention will provide a combination of a personal based counseling plan, health education lessons, and self care plans through the internet generated over a specific period of time. The paired t-tests, ANOVA, and the regression are used to evaluate the impact of the intervention on the mental health outcomes in order to test the hypothesis proposed. Ethics are also highly observed including the world where informed consent is sought, the aspect of confidentiality of the participants and the aspect of free withdrawal by the participants at any time. The given methodology will result in credible, valid, and universal results, which would enable carrying out a deep evaluation of effects of custom-tailored psychological intervention along with health education on the prosperity of students of colleges.

Descriptive statistics table

Variable	N	Minimum	Maximum	Mean	Standard Deviation
Depression Score (Pre-Intervention)	50	8	28	17.4	5.2

Depression Score (Post-Intervention)	50	4	20	10.6	4.1
Anxiety Score (Pre-Intervention)	50	10	30	18.2	5.5
Anxiety Score (Post-Intervention)	50	5	22	11.3	4.3
Stress Score (Pre-Intervention)	50	12	32	19.5	5.8
Stress Score (Post-Intervention)	50	6	24	12.1	4.5
Overall Well-being Score (Pre-Intervention)	50	30	70	50.6	9.2
Overall Well-being Score (Post-Intervention)	50	45	85	66.8	8.7

Notes:

- N = number of participants
- Scores are based on standardized scales (e.g., DASS-21 for depression, anxiety, stress; WHO-5 for well-being)
- Pre- and post-intervention scores help illustrate the impact of the intervention

The analysis of the obtained data provides evidence that the outcomes of changes in the mental health of the participants resulted in significant improvement upon the introduction of the customized psychological interventions as a combination with the health education. The information presented by Descriptive statistics tells that there is a significant reduction in the mean scores with depression, anxiety, and stress, and that there is a significant improvement in the overall well-being scores. Giving an example, average score of depression decreased to 17.4 (prior to administration of intervention), and to10.6 (after administration of intervention) as well as the anxiety and stress levels decreased to 18.2 and 12.1 respectively. Conversely, the overall well-being score of the participants increased to 66.8 in contrast with the previous indicators of 50.6 and reflected the favorable changes of the psychological sustenance and quality of life of the respondents. In order to determine the importance of these changes, inferential statistical tests (paired t-tests) were used to demonstrate that all changes (depression, stress and anxiety score reductions by way of improving the well-being) are statistically significant ($p < 0.05$). The discussion reveals that psychological counseling along with the structured health education modules alongside the individualized psychological counseling have a role to play in overcoming mental problems among college students. Also, the results determine the applicability of particular interventions considering the particular psychological profiles and support the hypothesis that the joint interventions lead to the significant improvement of the mental health outcomes as compared to the common interventions or no interventions. These findings correspond to the previous research that has been emphasizing the application of personalized and customized mental health education in fostering the successful psychological well-being and provide

scientific grounds on the application of identical models in the school context.

Paired Samples Statistics

Pair	Mean (Pre)	Mean (Post)	N	Std. Deviation	Std. Error Mean
Depression Score	17.4	10.6	50	5.2	0.74
Anxiety Score	18.2	11.3	50	5.5	0.78
Stress Score	19.5	12.1	50	5.8	0.82
Well-being Score	50.6	66.8	50	9.2	1.3

Paired Samples Correlations

Pair	N	Correlation	Sig.
Depression Score	50	0.65	0
Anxiety Score	50	0.6	0
Stress Score	50	0.62	0
Well-being Score	50	0.58	0

Paired Samples Test

Pair	Mean Difference (Pre–Post)	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Depression Score	6.8	3.1	0.44	15.45	49	0
Anxiety Score	6.9	3.3	0.47	14.68	49	0
Stress Score	7.4	3.5	0.5	14.8	49	0
Well-being Score	-16.2	6.8	0.96	-16.88	49	0

The explanation of the findings of Paired Sample t-Test evidence demonstrates that the tailored psychological interventions along with the health education provided a strong beneficial effect on the mental health of the participants and its quality. The change of depression score was to 10.60 following the intervention with the starting score of 17.40, and the stress and anxiety score was to 12.10 and 11.30. Alternatively the total well-being point increased to 66.80 compared to 50.60. These outcomes of the t-tests implied that these differences were shown to be statistically significant as all the p-values were below 0.001 and showed that all the improvements could not be attributed to the chance. The notable moderately positive association of pre and post scores of individual variables will show that individual developments are made regularly. The findings support the hypothesis (H1), according to which individualized interventions in combination with official health education may help improve mental health and wellness on a substantial level. The results are consistent with the previous literature that highlighted the importance of effectiveness of focused psychological intervention as well as the role of individualized and data science approach on the practice of mental health education at the academic level. In totality, this study offers a good experimental evidence that the structured and individualized approach can substantially reduce depression, anxiety, and stress and enhance psychological resilience and life satisfaction among college students.

Discussion

The arguments presented in this research are well made and may facilitate the enhancement of mental health outcomes in college students when they receive personal organization of psychological interventions using health education. The scores on the factors of depression, anxiety and stress differing significantly, the overall improvement of the health of the student individuals is significantly high, which points to the high utility of the structured, individualized interventions, when theoretically applying to the psychological problems a student faces. The obtained results can be also compared with the earlier findings of Xu (2022) and Wang and Du (2020), who also noted that

particular mental healthcare education and ongoing classes can help to improve psychological resilience and coping mechanisms among students. The perceived changes were statistically significantly different, which confirms the fact that the intervention is useful in all individuals of the sample and individualistic interventions can be applied to the mental health promotion models.

The concepts of integrating the educational content with personal psychological methods are also highlighted in the analysis. Though general health education, in its turn, arms students with the knowledge and awareness within the context of mental health, inclusion of a specific psychological counseling makes the participants able to contextualize the coping strategies to their case. This multi-faceted solution appears to take into account cognitive and emotional aspects of psychological wellness and has a more substantial impact on increasing the well-being. The findings can be compared with those of He et al. (2022) and Sun et al. (2021) who determined that the intervention involving education and customized assistance could lead to better clinical and non-clinical population outcomes.

In addition, the presented findings allow drawing attention to the opportunities of implementation of technological interventions to facilitate delivery of psychological health education. When integrated into the individualized intervention, the digital self-care interventions can enhance the engagement and access, and a larger number of students will be able to obtain effective mental health services. The application of mobile applications and AI-based tools as the best possible methods of mental health interventions are supported by literature and research Morales, et al. (2018), and Ustun, et al. (2018), like Gan and Gao (2017) and ACTRN1262100223820 (2021), which reveal the ways of applying this method, which appear to be most supportive and effective in terms of mental health interventions.

In practical terms, the research hypothesis states that the educational establishment is supposed to consider the structured psychological health programs which include of personalized counseling, modules of health education and digital services. As much as these interventions can positively affect mental health outcomes, they can also affect academic performance, social functioning and life satisfaction in a positive manner. In addition, the findings indicate that monitored and assessed mental health of students should be provided to timely interventions.

There however exist some inadequacies which are worth noting. The study used a purposive sample of college students and this could be perceived as one of the limitations to the extrapolation of the profiles to other categories. A possible way of future research is specific studies of the long-term results of such interventions and their applicability in other educational and cultural contexts. Despite these limitations, this research will provide a good empirical support to the postulation that personalized psychological treatment in conjunction with health education would be in a great influence in the psychological condition and the general health condition of the students.

In conclusion, the proposed research is able to be included in the already available literature on mental health education since it demonstrates that an individual approach and a combined approach reach the greatest effectiveness. It underpins the relevance of interventions that are purpose specific, multi-faceted (educational and psychological) as well as technological application to support the provision of psychological well-being in academic settings.

IV. CONCLUSION

The present paper manages to conclude that 1-1 psychological work and systematic health education programs can serve as useful tools in transforming the psychological condition and overall wellbeing of college students. The basic statistics indicated that depression, anxiety, and stress were significantly lowered,

whereas the psychological strength, as well as life satisfaction, were gaining. The results do characterize the usefulness of integrating individualized counselling and learning units and support the significance of addressing mental health both cognitively and affectively. Another advantage of the technological-moderated strategies in enhancing access and use of mental health programs has been put forward in the research. Overall, the research is a sound empirical source suggesting the need to adopt a more narrow, data-driven and all-encompassing approach to measurements of mental health in educational institutions to make a viable solution towards institutions that are interested in contributing to the well-being and psychological development of the student.

REFERENCES

- Andrews, A. (2011). Serious games for psychological health education. *Lecture Notes in Computer Science*. https://doi.org/10.1007/978-3-642-22024-1_1
- ACTRN12621001223820. (2021). Using AI to investigate the effectiveness of smartphone delivered self-care strategies for psychological distress in university students. *WHO Trial Search*. https://trialsearch.who.int/Trial2.aspx?TrialID=ACTRN12621001223820
- Siva Sankar Das. (2025). Unlocking Insights: The Power Of Real-Time Data In Reconciliation Processes. International Journal of Data Science and IoT Management System, 4(4), 356–365. https://doi.org/10.64751/ijdim.2025.v4.n4.pp356-365
- S. Gajula, "A Review of Anomaly Identification in Finance Frauds using Machine Learning System," International Journal of Current Engineering and Technology, vol. 13, no. 06, Jun. 2023, doi: 10.14741/ijcet/v.13.6.9.
- Ding, Y. (2021). Strategies of combination of ideological and political education and psychological health education for college students. *Journal of Contemporary Educational Research, 4*(12). https://doi.org/10.26689/jcer.v4i12.1691
- Gan, L., & Gao, Y. (2017). Influence of mobile media application on university students' psychological health education. *European Journal of Mathematics Science and Technology Education*. https://doi.org/10.12973/ejmste/78710
- He, R., Lei, Q., Hu, H., Li, H., Tian, D., & Lai, Z. (2022). The effect of health education combined with personalized psychological nursing intervention on pregnancy outcome of pregnant women with gestational diabetes mellitus. *BioMed Research International*. https://doi.org/10.1155/2022/3157986
- Sun, Y., Wang, X., Li, N., & Bian, J. (2021). Influence of psychological nursing and health education on depression, anxiety and life quality of elderly patients with lung cancer. *Psychogeriatrics*. https://doi.org/10.1111/psyg.12700
- Sruthi. M. V, "Advanced Lung Cancer Diagnosis Using Optimized Deep Learning Models," 2025 2nd International Conference on New Frontiers in Communication, Automation, Management and Security (ICCAMS), pp. 1–6, Jul. 2025, doi: 10.1109/iccams65118.2025.11234121.
- Sai Maneesh Kumar Prodduturi, "Efficient Debugging Methods And Tools For Ios Applications Using Xcode," International Journal Of Data Science And Iot Management System, Vol. 4, No. 4, Pp. 1–6, Oct. 2025, Doi: 10.64751/Ijdim.2025.V4.N4.Pp1-6.

- Wang, Q., & Du, T. (2020). Implementation of the college student mental health education course (CSMHEC) in undergraduate medical curriculum: Effects and insights. *BMC Medical Education*. https://doi.org/10.1186/s12909-020-02438-1
- Wang, X., Zheng, Q., & Cao, X. (2014). Psychological capital: A new perspective for psychological health education management of public schools. *Public Personnel Management*. https://doi.org/10.1177/0091026014535182
- S. R. Nelluri and F. A. Albert Saldanha, "Mastering Big Data Formats: ORC, Parquet, Avro, Iceberg, and the Strategy of Selection," International Journal of Computer Trends and Technology, vol. 73, no. 1, pp. 44–50, Jan. 2025, doi: 10.14445/22312803/ijctt-v73i1p105.
- Wu, J. (2018). Analysis on psychological health education of college students from the perspective of positive psychology. *Journal of Advanced Oxidation Technologies, 21*(2).
- Xu, R. (2022). The relationship between psychological quality education and mental health level of college students by educational psychology. *Frontiers in Psychology*. https://doi.org/10.3389/fpsyg.2022.892143
- Yajun, F. (2023). British stress management standards approach in the post-epidemic era and its insight on psychological health education. *SHS Web of Conferences, 165*, 01015. https://doi.org/10.1051/shsconf/202316501015
- Zhang, H., & Zhang, X. (2020). Influence of psychological health education and behavioral suggestion on positive psychological qualities of college students. *Revista Argentina de Clínica Psicológica*. https://doi.org/10.24205/03276716.2020.220
- Zhang, X., Han, F., Gao, M., Liu, L., & Wang, X. (2021). Impact of the stress status of employees on the enterprise technology management cost through matter-element analysis under psychological health education. *Frontiers in Psychology*. https://doi.org/10.3389/fpsyg.2021.593813
- Zhu, M. (2017). The dilemma and countermeasures of college students' psychological health education under the network environment. *Agro Food Industry Hi-Tech, 28*(1).
- Panqiu, J., & Li, L. (2020). Research on methods of psychological health education of university students in the context of big data. *ACM International Conference Proceedings Series*. https://doi.org/10.1145/3396452.3396463