

# Prediction of Mental Health Support of Employee Perceiving by Using Machine Learning Methods

Hossein JAMALIRAD<sup>a</sup> and Mahdie JAJROUDI<sup>a,1</sup>

*<sup>a</sup>Department of Medical Informatics, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran*

**Abstract.** Employees' mental health addresses concerns in the technology industry phenomenon. Machine Learning (ML) approaches show promise in predicting mental health problems and identifying related factors. This study used three machine learning models on OSMI 2019 dataset: MLP, SVM, and Decision Tree. Five features are extracted by permutation ML's method on the dataset. The results indicate that the models have been reasonably accurate. Moreover, they could effectively support predicting employee mental health comprehension in the technology industry.

**Keywords.** Machine Learning, Public Health, feature importance, prediction model

## 1. Introduction and Methods

In the new global economy, public mental health has become a central issue for interventions, resulting in a broad range of impacts and associated economic savings, even in the short term [1,2]. They can prevent any imposed cost from the individual up to firms, society, and governmental scope. Mental health assessments represent a framework and mechanism to fulfill reasonable responses for mentioned issue [3]. The lack of practical support for psychological problems can also affect an employee's productivity, absence, work commitment, and self-confidence [4]. Using machine learning techniques to predict mental health issues is considered a promising approach for early prevention of the issues mentioned [5]. The research is being conducted for using these methods to predict employees' perceiving of mental health support in the tech industry and ascertaining related factors. Although extensive research has been carried out on mental health [4,6-9], to our knowledge, no single study exists that focuses on the mental health understanding of employees.

We analyzed the Open Sourcing Mental Illness (OSMI) Mental Health in Tech Survey dataset[10]. Pre-processing techniques were adopted to handle both missing and inconsistent data. Support Vector Machine (SVM), Multi-layer Perceptron (MLP), and Decision Tree were applied. To assess the validity of models used in this research, accuracy, sensitivity, and specificity are reported. Before the validity assessment, the

---

<sup>1</sup> Corresponding Author: Mahdie JAJROUDI, E-mail: jajroudi@gmail.com.

Permutation method was performed for feature selection. Needless to say, Scikit-learn 1.2 python library was used for all of these steps.

## **2. Result, Discussion and Conclusion**

OSMI dataset expressing different views in 82 features and 352 respondents. The accuracy, sensitivity, and specificity of this model for MLP are (74.00%, 72.50%, and 75.42%); for decision-tree (83.62%, 78.72%, 88.57%) and finally, SVM (71.174%, 81.13%, 73.50%). Also, five final extracted features encompass.

This study used machine learning methods to predict mental health support for employees in the technology industry and determine related factors in the OSMI dataset. The results showed that the models were accurate enough to predict how much AI could help employers to know their employees, perceiving that they are receiving mental support in their technology industry. significant features included the effect of mental disorders on work, discussing mental health in the workplace, health raised in the interview, previous experiences, and, last, feedback from the employer. The accuracy of the obtained models can compete with studies in other fields, indicating a promising approach for mental health professionals and public health practitioners. Mainly, missing values and inconsistent data are limitations of this study.

The predicted results of the models examined in this research are of appropriate accuracy, indicating a promising approach for mental health professionals. Additionally, those who are active in the public health field figure out influential factors regarding the support value of employee understanding that they are receiving mental support in their technology industry.

## **References**

- [1] Alonso SG, et al. Data mining algorithms and techniques in mental health: a systematic review. *Journal of medical systems*. 2018; 42:1-15.
- [2] Campion J. Public mental health: key challenges and opportunities. *BJPsych international*. 2018;15(3):51-4. doi.org/10.1192/bji.2017.11
- [3] Brouwers E, et al. To disclose or not to disclose: a multi-stakeholder focus group study on mental health issues in the work environment. *Journal of occupational rehabilitation*. 2020; 30:84-92.
- [4] Hogg B, , et al. Supporting employees with mental illness and reducing mental illness-related stigma in the workplace: an expert survey. *European Archives of Psychiatry and Clinical Neuroscience*. 2022.
- [5] Gupta S, Saluja K, Goyal A, Vajpayee A, Tiwari V. Comparing the performance of machine learning algorithms using estimated accuracy. *Measurement: Sensors*. 2022;24: 100432.
- [6] Alam T, Chen T, Bucholtz M, Antoniou G. Investigating Mental Wellbeing in the Technology Workplace Using Machine Learning Techniques. *Artificial Intelligence in Healthcare: Recent Applications and Developments*: Springer; 2022. p. 165-77.
- [7] Choi Y, Choi J. Job Satisfaction Prediction and Machine Learning Technique. 2022. doi.org/10.21203/rs.3.rs-1683972/v1
- [8] Sujal B, et al., Mental Health Analysis of Employees using Machine Learning Techniques. 2022 14th International Conference on Communication Systems & NETworkS (COMSNETS); 2022: IEEE. doi.org/10.1109/COMSNETS53615.2022.9668526
- [9] Wei W. The Impact of Artificial Intelligence on the Mental Health of Manufacturing Workers: The Mediating Role of Overtime Work and the Work Environment. *Frontiers in Public Health*. 2022;10.
- [10] Kaggle 2019 [Available from: <https://www.kaggle.com/datasets/osmihelp/osmi-mental-health-in-tech-survey-2019>.