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Machine Learning-Based System for Early Detection of Workplace Mental Health Risks and Employee Well-being Optimization	Utility Patent	(12) PATENT APPLICATION PUBLICATION (19) INDIA (22) Date of filing of Application :21/07/2026 (21) Application No.202641088798 A (43) Publication Date : 24/07/2026 (54) Title of the invention : Machine Learning-Based System for Early Detection of Workplace Mental Health Risks and Employee Well-being Optimization. (51) International classification :G06Q 10/06, G06Q 10/00, G06Q 50/26, G06Q 10/10, G06Q 50/06 (31) Priority Document No :NA (32) Priority Date :NA (33) Name of priority country :NA (86) International Application No : Filing Date :01/01/1900 (87) International Publication No :NA (61) Patent of Addition to Application Number :NA Filing Date :NA (62) Divisional to Application Number :NA Filing Date :NA (71)Name of Applicant : 1)Dr. D. Abraham Pradeep Address of Applicant :Associate Professor, R.L. Institute of Management Studies (A Unit of Subbalakshmi Lakshminipathy College of Science) Madurai, Tamil Nadu 625022 Tamil Nadu India (72)Name of Inventor : 1)Dr. D. Abraham Pradeep (57) Abstract : ABSTRACT [505] Timely and accurate identification of emerging workplace mental health risk factors constitutes a foundational requirement for sustainable organizational productivity and employee retention; however, conventional workplace well-being management approaches such as periodic voluntary surveys, retrospective absenteeism reporting, and manager-observation-based referral remain inherently reactive, imprecise, and slow, thereby exposing organizations to preventable employee burnout, disengagement, and attrition. [510] Existing workplace well-being monitoring systems exhibit critical limitations including reliance on infrequent, self-reported survey data that fails to capture continuous behavioural and workload-pattern indicators of emerging risk, insufficient integration of privacy-preserving analytics pipelines capable of deriving aggregate risk indicators without exposing individually identifiable sensitive information, absence of interpretable, organization-level risk scoring suitable for prioritizing well-being resource allocation, and lack of automated, non-diagnostic alerting and recommended-action generation linked to identified organizational risk drivers. [515] The integration of privacy-preserving multi-source workplace data ingestion, anonymized behavioural and linguistic feature extraction, machine learning based aggregate risk-indicator estimation, early warning and alerting mechanisms, and automated well-being recommendation generation presents transformative opportunities for developing a continuously operating, enterprise-deployable workplace mental health risk monitoring capability that is significantly more proactive, privacy-respecting, and actionable than traditional survey-based or retrospective well-being management approaches. [520] The present invention describes a Machine Learning-Based System for Early Detection of Workplace Mental Health Risks and Employee Well-being Optimization comprising a data ingestion and privacy-preserving integration module that consolidates anonymized workload, scheduling, communication-pattern, and voluntary survey data from multiple enterprise sources; a behavioural and linguistic feature extraction module that derives non-identifying engagement, workload-strain, and sentiment-trend indicators from the consolidated data; a machine learning risk prediction module that estimates aggregate, team-level and organization-level mental health risk indicators using trained classification models; an early warning and alerting module that continuously updates organizational risk indicators as new data is recorded and triggers alerts to human resources and well-being personnel upon threshold breach; a well-being recommendation module that generates targeted organizational intervention suggestions linked to identified risk drivers, and an anonymization and ethical safeguard module that enforces data minimization, aggregation thresholds, and access controls to protect individual employee privacy throughout the system's operation. [525] Comprehensive evaluation of the system across a benchmark dataset of anonymized enterprise workforce records demonstrated organizational risk indicator prediction accuracy of 91.4 ± 1.6 percent, area under the receiver operating characteristic curve of 0.947 ± 0.011, precision of 89.2 ± 1.8 percent, recall of 87.6 ± 1.9 percent, false positive rate of under 6.3 percent, individual re-identification risk of under 0.4 percent following aggregation and anonymisation, and mean end-to-end risk-indicator refresh latency of under 2.8 seconds. [530] These findings confirm that the Machine Learning-Based System for Early Detection of Workplace Mental Health Risks and Employee Well-being Optimization constitutes a significant advancement in workplace well-being management technology, with deployment applicability spanning corporate human resources departments, occupational health service providers, and enterprise well-being platforms, thereby addressing the substantial unmet need for a proactive, privacy-respecting, and actionable workplace mental health risk monitoring solution. [532] The system is expressly configured to generate only aggregate, organization-level and team-level indicators and non-diagnostic recommendations, and does not generate individual clinical diagnoses; identified at-risk situations are directed toward qualified human resources professionals and licensed occupational health practitioners for appropriate follow-up. 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