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Psybridge: AI-Augmented Mental Health Assessments for Personalized Therapy

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Abstract

The application of artificial intelligence (AI) in mental health care is demonstrating promising potential for early identification, personalized insights, and improved therapy outcomes.

However, existing tools are hindered by language accessibility, the integration of multiple assessments, and interpretability. We conduct a literature-based analysis of existing approaches in personality classification and clinical assessment, identify key gaps, and propose a unified solution that integrates psychological understanding with technological precision. This study lays the groundwork for a flexible and inclusive system to aid therapists in clinical settings.

This research emphasizes the integration of AI- based personality profiling and clinical assessment into one multilingual, privacy-driven system. By combining MBTI-based insights with standardized screeners such as PHQ-9 and GAD-7, PsyBridge offers a unified solution for early identification and personalized therapy recommendations. The proposed framework demonstrates the potential of NLP-powered mental health tools to enhance accessibility and clinical accuracy.

Introduction

There is a growing global demand for mental health assistance, with millions affected by anxiety, depression, and cognitive issues.

Access to effective mental health care remains uneven due to social stigma, limited resources, and linguistic or cultural barriers. In many regions, psychological services are unavailable or inconsistent, particularly for individuals requiring personalized attention and language-friendly tools. Personality profiling is crucial in therapy and diagnosis since it helps practitioners understand behavioral patterns and emotional responses. Early mental health screening tools are essential for identifying symptoms before they worsen. However, most current systems operate independently — providing either personality-based evaluations or standardized clinical assessments — and rarely cater to diverse linguistic backgrounds.

The recent advancements in AI and NLP offer promising possibilities for scalable and intelligent mental health support systems.

These technologies facilitate a more nuanced understanding of patient responses, enabling systems to provide insights that are both personalized and interpretable. This paper introduces PsyBridge, an AI-assisted system designed to bridge the gap in psychological profiling and mental health assessment. Its

development is guided by inclusivity, accuracy, and clinical applicability, presenting a fresh perspective on how technology can aid therapeutic practices.

This study contributes to the field of computing education and digital healthcare by presenting an interdisciplinary approach that merges artificial intelligence, psychology, and user-centered design. PsyBridge aims to support both mental-health professionals and academic researchers by demonstrating how NLP models can interpret linguistic cues to personalize therapy. Furthermore, it serves as an educational framework for students and practitioners exploring the application of AI in human-behavior analysis**.**

Literature Review

A plethora of studies over the past decade has investigated the intersection of AI, personality theories, and psychological assessments.

. Keh and Cheng (2019) used transformer-based models like BERT for MBTI classification, demonstrating that deep contextual embeddings can capture subtle personality cues from text [1]. Cui et al. (2024) introduced the concept of "Machine Mindset," aligning AI behavior with MBTI-based personality traits through Direct Preference Optimization (DPO) [2]. The reliability and validity of personality models have also been assessed, showing their effectiveness in predicting academic performance and job-relevant behavior [3, 4]. Sheth and Pandhare (2024) employed machine learning techniques for MBTI classification, yielding promising results [5].

Beyond personality profiling, standardized screeners such as the PHQ-9 and GAD-7 are widely used for diagnosing depression and anxiety, respectively.

Both tools have been validated across populations and are recommended in clinical guidelines [6].. Although personality models are gaining traction on digital platforms, most implementations cater primarily to English speakers, and few systems offer a combination of personality insights and clinical screening capabilities. Several AI-enabled mental- health systems have been developed in recent years. For example, *Woebot* (Fitzpatrick et al., 2017) uses conversational agents for cognitive behavioral therapy, while *Wysa* employs AI-guided journaling to track emotions and promote self-reflection. However, these tools primarily rely on English text processing and do not integrate structured psychological profiling.

Replika (2023) applies deep-learning chat models to create emotionally intelligent responses, yet lacks clinically validated screening modules. Comparative studies (Ghosh & Dutt, 2023; Zhang et al., 2022) highlight that most existing AI systems focus on engagement rather than diagnostic precision.

Unlike prior approaches, PsyBridge bridges personality analysis and clinical screening through a multilingual interface and interpretable NLP pipeline. This integration represents a meaningful advancement toward inclusive AI-driven psychological assessment.

PsyBridge seeks to address these shortcomings by presenting an AI-powered, multilingual framework.

Problem Identification

Despite AI and psychology advancements, mental health tools still face several challenges that hinder their utility and accessibility.

These challenges can be grouped into five main areas:

1. **Language and Cultural Barriers**

Most psychological tools cater primarily to English speakers, limiting their applicability in multilingual and multicultural populations, especially in countries such as India, where patients may feel more comfortable expressing themselves in regional or native languages.

2. **Disjoint Systems**

Personality assessments (such as MBTI) and clinical screeners (such as PHQ-9 or GAD-7) are usually offered separately, necessitating mental health professionals to use multiple platforms or paper forms.

This fragmented process increases cognitive load for both patients and healthcare providers, reducing the efficiency of diagnosis and therapy planning.

3. **Rigid Question Formats**

Many tools employ fixed multiple-choice or Likert- scale questions that do not fully capture the subtleties of a person's thoughts or feelings.

Rigid formats can lead to superficial or inaccurate responses, particularly from those preferring open- ended self-expression.

4. **Lack of Personalization and Interpretation**

Most tools provide simple binary or scored outputs without contextual interpretation or integration with other psychological insights.

There is minimal attempt to relate personality patterns with symptom severity or to provide feedback tailored to clinical situations.

5. **Limited AI Integration**

Although NLP and machine learning have proven effective in many domains, their application in mental health assessment remains limited, often neglecting personality traits, multilingual comprehension, and clinical

relevance.

Proposed System Overview

PsyBridge is a proposed AI-supported mental health framework that aims to combine personality profiling with established clinical screening tools in a multilingual and privacy-focused platform. By utilizing natural language processing and machine learning, the system seeks to overcome the shortcomings of current tools, offering a cohesive and intelligent mental health assessment process.

A. System Architecture

PsyBridge is designed as a modular framework comprising five core components: (1) Personality Profiling, (2) Clinical Screening, (3) Semantic Embedding Layer, (4) Multilingual Interface, and
(5) Secure Local Data Storage. Each module is interoperable and supports both standalone and integrated usage, thereby facilitating flexible deployment in clinical and semi-clinical settings.

B. Personality Profiling via MBTI Classification

The personality profiling module is built on the **Myers-Briggs Type Indicator (MBTI)** framework, decomposed into four binary traits: Introversion/Extraversion (I/E), Intuition/Sensing (N/S), Thinking/Feeling (T/F), and Judging/Perceiving (J/P). Unlike traditional Likert- based instruments, PsyBridge employs a **short- answer format** where users respond to open-ended questions specifically designed to elicit linguistic patterns indicative of each dichotomy.

To process these inputs, the system utilizes **Sentence-BERT (SBERT)**, a transformer-based language model, to generate semantic embeddings of each user's response. Trait-level classification is then performed using independently trained **classifiers**, each optimized for one MBTI dimension. The models are trained on a curated and pre-processed dataset containing text-labeled personality data.

This design enables the system to produce interpretable personality outputs from natural language, offering deeper insights than conventional discrete surveys.

C. Clinical Screening Integration

PsyBridge incorporates three validated clinical screeners commonly used in psychiatric and psychological practice:

- **PHQ-9**: A 9-item depression assessment tool aligned with DSM-IV criteria.
- **GAD-7**: A 7-item measure of generalized anxiety symptoms.

Additionally, the platform includes the **Digit Span Test** (forward and backward recall) to measure short-term and working memory. These tools are fully integrated into the platform and scored automatically.

D. Semantic Embedding Layer

All free-text responses are passed through a semantic encoder, pre-trained on general-purpose corpora and optimized for capturing sentence-level semantics. This architecture ensures that linguistic variability, context, and expression style do not impede accurate classification.

E. Multilingual Support

Recognizing the linguistic diversity of mental health populations, PsyBridge provides a **multilingual interface** supporting English, Hindi, and Marathi. The question bank is stored in structured format with language tags and served dynamically based on the user's preference. This feature improves inclusivity and facilitates expression among non-English-speaking patients.

F. Privacy and Local Storage

To ensure ethical compliance and data sovereignty, PsyBridge adopts a **fully offline storage model**:

- No internet access or cloud sync is required.
- Patient data — including MBTI results, PHQ-9/GAD-7 scores, and textual inputs
— is saved locally in an encrypted CSV format.
- This design supports integration into clinical workflows while maintaining patient confidentiality.

G. User Interface

The frontend interface is designed with a focus on mental health accessibility:

- Progressive disclosure of questions across categories
- Real-time progress bar to reduce cognitive fatigue
- Minimalist and calming color schemes for reduced anxiety
- Responsive across desktop and mobile interfaces

H. System Workflow

The workflow of the proposed **PsyBridge system** is illustrated in **Figure 1**.

The process begins with **User Interaction**, where users log in, select a preferred language, and complete short questionnaires designed to assess personality and psychological state.

The responses are passed into the **Cognitive and Emotional Assessment** module, which

integrates multiple evaluation tools including the **MBTI** (for personality profiling), **PHQ-9** (for depression screening), **GAD-7** (for anxiety assessment), and the **Digit Span test** (for cognitive functioning). These assessments generate quantified and text-based outputs reflecting both cognitive and emotional parameters.

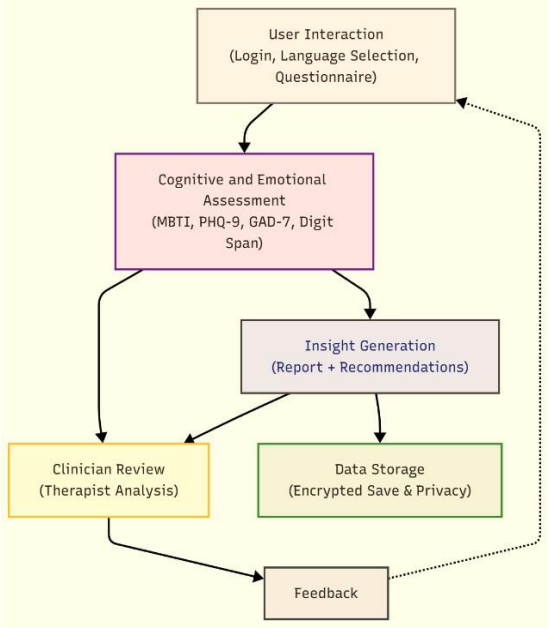

*Figure 1: Workflow of the PsyBridge System***.**

The data from these tools are then processed by the **Insight Generation** layer, which compiles a comprehensive report consisting of personality type, mental health indicators, and system-based recommendations for self-care or professional consultation.

All generated insights are stored securely in the **Data Storage** module, which ensures encrypted local saving and strict user-data privacy. The results may optionally be forwarded for **Clinician Review**, allowing therapists to analyze user outcomes and provide expert feedback.

Finally, users receive **Feedback** from the system or clinician, completing a continuous improvement loop where user responses can guide future evaluations.

This cyclic flow ensures that PsyBridge functions not only as an automated screening system but also as a collaborative decision-support tool for both patients and professionals.

Conclusion

This study introduces PsyBridge, a modular, AI-assisted platform for psychological assessment that integrates personality profiling with validated clinical screening tools. Designed to address the limitations of traditional mental health systems, including linguistic inaccessibility, fragmented toolchains, and rigid questionnaire formats, PsyBridge leverages natural language processing and machine learning to provide a unified, personalized, and multilingual diagnostic experience.

The use of Sentence-BERT embeddings in conjunction with classifiers enables the system to derive MBTI-based personality insights from open- ended user responses. Furthermore, the seamless integration of PHQ-9, GAD-7, and Digit Span assessments ensures that the platform supports both self-reflection and clinically relevant diagnostics within a single interface.

The initial design and implementation demonstrate the feasibility of combining data-driven personality modeling with structured clinical screening. Early results using the pre-processed dataset indicate improved classification accuracy compared with traditional MLP models, supporting the use of tree- based classifiers for short-text personality inference.

Future Work

In future iterations, we aim to do the following:

- Expand language support to include other regional and global languages.
- Improve model accuracy through domain-specific fine-tuning of transformer encoders.
- Conduct real-world clinical trials in collaboration with mental health practitioners to validate the effectiveness of the system.
- Integrate additional cognitive and behavioral assessments, including mood tracking and emotion recognition.
- Deploy the platform as a secure desktop/mobile application with clinician login and session tracking features.

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