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AI-driven Foundation Models for Decoding Human Brain Imaging in Psychiatry and Neurology

Stanford researchers have invented a unified AI architecture that integrates foundational models (FMs) with AI techniques for efficient analysis of fMRI data in psychiatric disorders.

Conventional approaches to fMRI data analysis encounter challenges in scalability and adaptability and rely heavily on extensive labelled datasets which are hard to obtain, thus hindering progress in psychiatric research. There is an unmet need for advanced analytical tools to decode complex fMRI data for psychiatric conditions.

This invention from Stanford researchers addresses this need using a novel approach that trains foundational models (FMs) using AI techniques, enabling efficient fMRI analysis without extensive labelled datasets. These FMs, fine-tuned with minimal labelled data, identify neurobiological markers, and predict symptom severity for various brain disorders. This approach is scalable, versatile, and seamlessly integrates diverse datasets to uncover personalized biomarkers and therapeutic targets for psychiatric conditions. In conclusion, this invention offers a unified solution for the complex challenges in functional brain imaging, facilitating advancements in precision diagnostics and targeted treatments for brain disorders.

Stage of Development
Software is well developed and tested to generate some preliminary results that identified clinically relevant neurobiological features to diagnose different psychiatric disorders and predicted symptom severity in individuals with psychiatric conditions.

Applications

- Diagnostic software for healthcare providers.
- Research platform for academic and pharmaceutical researchers.
- Data analytics service for government agencies and technology companies.

Advantages

- Precise diagnosis of psychiatric conditions.
- Scalable handling of large complex datasets.
- Seamless data integration for comprehensive analysis.
- Cost-effectiveness due to automation of fMRI data analysis.
- Personalized treatments based on individual biomarkers.

Publications

- Prior study using a different model: Kim, Lisa. Stanford Medicine study identifies distinct brain organization patterns in women and men. *Stanford Medicine News* (2024).
- Prior study using a different model: Bertagnolli, Monica M. Aided by AI, Study Uncovers Hidden Sex Differences in Dynamic Brain Function. *NIH Director's Blog* (2024).

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