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## Open-source web-based recognition system: automated and explainable analysis for diverse research applications

RIBAS, Lucas Correia<sup>1</sup>; FURTADO, Emanuel Ferreira<sup>2</sup>; BRUNO, Odemir Martinez<sup>2</sup>

emanuelferreirafurtado@ifsc.usp.br

<sup>1</sup>Instituto de Biociências, Letras e Ciências Exatas - UNESP; <sup>2</sup>Instituto de Física de São Carlos - USP

In this study, we present an open-source web-based recognition system powered by deep learning for automated and explainable analysis. The platform emphasizes interdisciplinary use and accessibility for non-technical users. It provides a user-friendly interface that allows researchers to interact with neural networks for tasks such as image recognition and data analysis. Traditional methods in these areas, such as counting and classifying in biology and medicine, often involve complex, time-consuming procedures that require specialized technical expertise. The application aims to simplify the process, reducing the need for technical skills while ensuring accurate results. The application uses *Convolutional Neural Networks* (CNNs), which are particularly effective for image classification and object detection tasks. CNNs have gradually become the mainstream algorithm for image classification since 2012, and the CNN architecture applied to other visual recognition tasks (such as object detection, object localization, and semantic segmentation) is generally derived from the network architecture in image classification. (1) This ability significantly reduces manual effort and accelerates workflows, as CNNs can perform tasks like feature extraction and pattern recognition with much higher speed and accuracy than traditional methods. To be more confident the application uses *Explainable AI* (xAI). xAI focuses on making the results of AI models understandable for users, especially when these models are applied in critical fields like healthcare, finance, or research. This transparency is crucial, as it allows users to understand the reasoning behind the AI's decisions, building trust and enabling more informed decision-making. (2) The open-source nature allows users to customize the platform to fit their specific needs, enabling easy integration into existing research workflows. This connection between AI research and practical application helps researchers perform complex analyses with less effort while maintaining a good accuracy. By simplifying the use of neural networks, the application makes cutting-edge AI technology accessible to a broader range of users, advancing scientific progress even for non-IT users.

**Palavras-chave:** Pattern recognition; Neural networks; Interdisciplinary.

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