Enhancing the development of BCI processing pipelines

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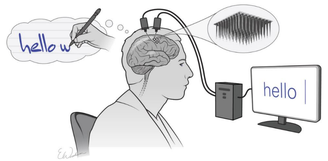
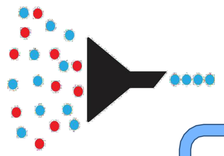
Background

BCI are technologies that allow users to communicate using only **neural activity.**





Brain signals must be **processed** before a thought can be extracted.

These processes require **programming experience** and time to build. Furthermore, **minimal code standardization** hinders collaboration/code-sharing.

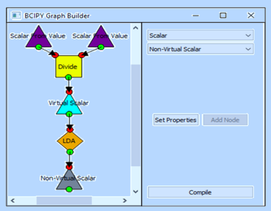
Research Question

How can a software tool reduce technical barriers and standardize processing code in BCI development?

Methods

Software Library Backend

Drag-and-Drop pipeline generator to support no-code pipeline development



Seamless **integration** with BCI interfaces

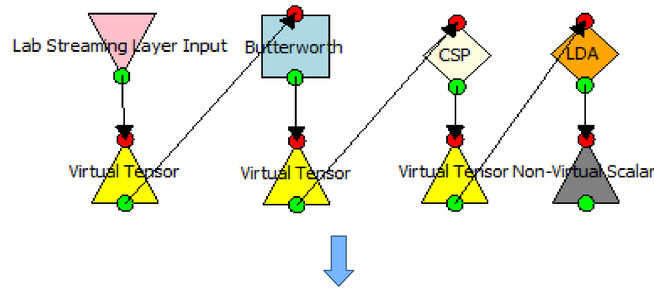
Easy-to-use custom pipeline creator that integrates with new/existing interfaces

A software tool to reduce technical barriers to Brain Computer Interface (BCI) development

Results

Building a Standard Processing Pipeline:	
Method	Number of lines of code
MATLAB	~300
Python Backend	~50
Visual Interface	0

Standard Processing Pipeline built with the tool



Minimizes programming knowledge needed to design a processing pipeline

Conclusion/Next Steps

By enhancing the BCI development process, the tool:

- Expands **BCI Clinical Usability**
- **Encourages engagement** in BCI research from individuals without programming knowledge
- **Supports inter-lab collaboration** and code-sharing by standardizing BCI pipeline processes and code.

Integrations into existing BCI applications will serve to demonstrate the **flexibility, robustness, and functionality** of BCIPy throughout BCI research.

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