Deadline: February 16, 2024 – 2 weeks (January 25, 2024)

AIM 4000 Words

T4 Track - Neural Networks and Data Mining

https://iis-international.org/its2024-generative-intelligence-and-its/

Abstract

Introduction

Para 1: Objectives (problems in piloting, workload, deviation assessment)

Aircraft pilots are constantly undergoing situations in which they must process significant amounts of data in very small periods of time. The ability to detect whether tasks are being performed based on a set of guidelines can allow users the foresight to make adjustments early on in order to prevent failures, or even to increase their respective efficiency. An observational methodology study using a Line Operations Safety Audit (LOSA) (where expert observers are placed in the cockpit during normal flights to record threats) was performed over a period of 15 years with confidential data collected on more than 3500 domestic and international flights. Supported by the Federal Aviation Administration and the International Civil Aviation Organization, their reports indicate that some of the most common types of errors by Aircraft Pilots include a conscious failure to adhere to procedures or regulations (such as performing checklists from memory) and following procedures with wrong executions (incorrectly entering data into the flight management computer) [1]: These are issues that can be significantly reduced with the help of a real-time deviation system, though these systems are challenging to create for complex systems such as an aircraft.

Anticipate Brain state and predict Error Conditions, Validate current method through experiments that have been done using real pilots. Anticipate a potential error-prone state.

Para 2: Adequate adaptive performance in cognitive tasks requires continuous monitoring for the need to adjust performance strategies and executive control [1,12]. Neuroimaging studies and event-related brain potential research have identified the anterior cingulate cortex (ACC) as a critical component of the neural control circuit that implements this action monitoring system [2,7,9]. The ACC is thought to detect preconsciously the activation of erroneous or conflicting responses [8,10,13] and to signal the need to activate adaptive control processes, serving to instigate performance adjustments that minimize the risk of subsequent errors [1,13].

(Research questions and hypothesis in introduction)

Related Works

Methods

Data set (Flanker Description)

EEG Preprocessing

CNN Architecture (Or Transformer if increased performance)

Hyper Parameter tuning (Optuna)

Experiments

Maryam, maxime, marc-antoine Pilot Study

Tool for XPlane

Results

Parameters for SVM, Random Forest (CNN if Transformer works)

On Flanker Data Set (0.63 F1, Accuracy with 0.27 Kappa Score for Fair Agreement) (SVM, Random Forest, CNN)

On Aircraft EEG dataset

Conclusion