Classification of Motor Imagery EEG Signal for Navigation of Brain Controlled Drones

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Abstract. Navigation of drones can be conceivably performed by operators by analyzing the brain signals of the person. EEG signal corresponding to the motor imaginations can be used for generation of control signals for drone. Different machine learning and deep learning approaches have been developed in the state of the art literature for the classification of motor imagery EEG signal. There is still a need for developing a suitable model that can classify the motor imagery signal fast and can generate a navigation command for drone in real-time. In this paper, we have reported the performance of convolutional stacked autoencoder and Convolutional Long short term memory models for classification of Motor imagery EEG signal. The developed models have been optimized using TensorRT that speeds up inference performance and the inference engine has been deployed on Jetson TX2 embedded platform. The performance of these models have been compared with different machine learning models.

Keywords: Motor Imagery · Long Short Term Memory · Convolutional Stacked Autoencoder · Drone · Jetson TX2.

1 Introduction

With the emergence of drone technologies, drones have become an integral and significant component of almost every security and surveillance tasks in civil and military domain. In present scenario, the drones are controlled using hand-held remote controller or joystick. This limits the usability of the drones for vast applications as the hands get occupied in the navigation operation. This in effect causes an increase in the effective workload of an operator that lead to under-performance or fatigue of the operator. Thus in order to design a suitable interface for controlling the navigation of a drone, a hands-free control is most desirable solution. In the past decade, researchers across the world have worked towards the development of different hands-free interfaces using human interfaces such as body gesture, eye tracking and EEG signal. Brain controlled interfaces have gained significant attention due to the naturalistic way of human operation.