AURA: A Novel ResNet50 Approach to Predicting Karnofsky Performance Score and Survival Time of Glioblastoma Patients

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Glioblastoma (GBM) is the most deadly and most common brain cancer. Patients often lack the financial means for professional consultations, limiting their access to end-of-life care. 3 machine learning algorithms were proposed: InceptionV3, ResNet50, and MobileNetV2. The GBM progression metrics of survival time and Karnofsky Performance Score (KPS) were selected to be outputs of the algorithms. After training and testing, ResNet50 was found to have the highest predictive performance. It was cloned into two models which predicted survival time and KPS, and their accuracy was further improved by optimizing algorithm hyperparameters. They were deployed in the AURA mobile app, which displays patients' personalized GBM prognosis and provides end-of-life care resources. After optimization, the survival time and KPS ResNet50 models both scored a training accuracy of 100% and testing accuracies of 85.67% and 82.43% respectively. The proposed two-component solution was validated as the app and the ResNet50 models exceeded all success criteria. AURA's ResNet50 models reached accuracies previously unseen by other GBM predictive progression models, making the app a breakthrough in medical technology. Inexpensive and widely accessible, AURA is a high-fidelity prototype that brings essential resources to every GBM patient.

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