FlikcerAI: Resolution of Photosensitive Epileptic Visual Content With Spatio-Temporal Luminance Frequency Analysis

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Photosensitive epilepsy (PSE) is a neurological disorder, where seizures are triggered by aberrant flashes or specific spatial configurations of light. After COVID-19, billions of new internet users encounter such epileptic videos on a daily basis, accelerating the need for a solution. We propose a web application that can filter videos to be safe to view by patients of not only PSE but dyslexia, autism, Irlen syndrome, and the general photosensitive population. Based on ITU's proposed Ofcom guidelines, we developed FlikcerAI, a set of novel algorithms based on a vectorized machine learning model. Firstly, gamma-compressed RGB values are converted to luminance values as perceived by the human brain. Next, a CNN-RNN hybrid video classification model analyses the video spatially and temporally to detect possible triggers. We conducted a comprehensive analysis of five deep architectures on over 240,000 synthetic videos. We also developed four methods to filter possible triggers using algorithms like the fast Fourier transform (FFT). A critical element of our algorithm is its computational efficiency, allowing the world's first real-time implementation capable of analyzing over 100,000 video frames in minutes. FlikcerAI has been used to successfully resolve over 3000 videos by 500 users with highly positive feedback during qualitative assessment. We completed Phase I of our proposed ITU guideline testing with over 97% detection and 100% resolution accuracy. FlikcerAI is the first open-source tool of its kind. Its scalability, compatibility, and simplicity make it ideal to expand to video games, web pages, or even Virtual Reality.

Awards Won:
Second Award of $2,000
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