Tumor resection task

A study outlines the first investigation of the application of machine learning to distinguish “skilled” and “novice” psychomotor performance during a virtual reality (VR) brain tumor resection task. Tumor resection task participants included 23 neurosurgeons and senior neurosurgery residents as the “skilled” group and 92 junior neurosurgery residents and medical students as the “novice” group. The task involved removing a series of virtual brain tumors without causing injury to surround tissue. Originally, 150 features were extracted followed by statistical and forward feature selection. The selected features were provided to 4 classifiers, namely, K-Nearest Neighbors, Parzen Window, Support Vector Machine, and Fuzzy K-Nearest Neighbors. Sets of 5 to 30 selected features were provided to the classifiers. A working point of 15 premium features resulted in accuracy values as high as 90% using the Support Vector Machine. The obtained results highlight the potentials of machine learning, applied to VR simulation data, to help realign the traditional apprenticeship educational paradigm to a more objective model, based on proven performance standards. Graphical abstract Using several scenarios of virtual reality neurosurgical tumor resection together with machine learning classifiers to distinguish skill level [1].

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Siyar S, Azarnoush H, Rashidi S, Winkler-Schwartz A, Bissonnette V, Ponnudurai N, Del Maestro RF. Machine learning distinguishes neurosurgical skill levels in a virtual reality tumor resection task. Med Biol Eng Comput. 2020 Apr 11. doi: 10.1007/s11517-020-02155-3. [Epub ahead of print] PubMed PMID: 32279203.