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Supervisor review for the Bachelor Thesis: 'Feature Engineering for Spike Sorting' written by Arnold Ackerlauer

One of our former PostDocs, Ms. Kyriaki Kostoglou, PhD (now with TU Graz) supervised the bachelor thesis of Arnold Ackerlauer, 'Feature Engineering for Spike Sorting'. Ms. Kostoglou expressed that Mr. Ackerlauer was extraordinarily motivated and eager to learn new things. His critical thinking and his knowledge were his main positive attributes.

The task of his thesis was to extract meaningful features and classify neuronal action potentials (or else spikes) based on their waveform shape. It is widely known that different neurons produce different spike shapes. In order to extract the activity of different types of recorded neurons it is necessary to apply spike detection, feature extraction and spike sorting. Herein, Arnold Ackerlauer focused on different spike features and applied different techniques for feature selection (i.e., ANOVA and Random Forest feature importance). The implications of using univariate statistical testing (i.e., ANOVA) vs Random Forests for feature selection were nicely described. He tested his framework on synthesized data produced from real neuronal signals in order to have a ground truth to compare his final results.

His work was detailed, and his results were in line with previous literature. All necessary steps were well-documented and well-described (using appropriate tables and figures). Python codes of his work can be found online in GitHub.

His work gave him the opportunity to explore different aspects of machine learning (from feature selection to classification) using datasets from real biosignals. Apart of the main questions that Ms. Kostoglou asked him to address, he took the liberty to explore and analyze in more depth some of the aspects of this work. Ms. Kostoglou confidently states that Arnold Ackerlauer is worthy of obtaining a Bachelor of Science title, given the work performed in this thesis.

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