Abstract

Conversion electron spectroscopy is a viable tool when studying the nuclear phenomenon, shape coexistence. When a neutron-rich nucleus beta decays, a neutron transforms into a proton and emits an electron (β). The excited nucleus can then interact electromagnetically with the surrounding orbital electrons. This can result in the ejection of an internal conversion electron (e^-) from the atom. Because this process is essentially simultaneous in time, it is pivotal to differentiate between the electron (β) emitted from the nucleus and the internal conversion electron (e^-) emitted from the atom. Here we apply supervised machine learning algorithms to distinguish between one and two electron events, as well as, determine the origin of the electron. We used two different convolutional neural network (CNN) architectures to accomplish these tasks. With simulated data, we were able to successfully train a CNN to distinguish between a one and two electron event with 96.79% accuracy. Furthermore, we successfully trained a CNN to predict the origin of the electron for one electron events. Our results show promise that our models' performance will generalize to experimental data. Once our models are complete, machine learning will be an essential data analysis tool for conversion electron spectroscopy.