Spike sorting is a critical process in neural data analysis that aims to identify and classify the actional potential activity (“spikes”) of individual neurons from extracellular electrophysiological recordings [12,13,14]. Traditional recordings might last 8 hours, but to capture long-term brain changes critical to mental health, multi-day or multi-week recordings will be necessary[6]. Current spike sorting methods such as Kilosort rely on processing whole recordings, which means that long-term recordings cannot be processed since they saturate computer memory[12]. In this thesis, we present a novel method for spike sorting that utilizes Kilosort's algorithm while introducing subsampling to allow the handling of larger datasets. By focusing computational resources on selected data segments, we aim to enable the analysis of datasets that were previously impractically large without compromising sorting quality.  Using in-vivo rodent extracellular recordings, we quantify the degree of sub-sampling that enables the accurate representation of spiking data. This proof of concept work will enable continued work towards the creation of a full spike-sorting pipeline for multi-day or even multi-week electrophysiologic recordings.