Abstract Submitted
for the 4CS19 Meeting of
The American Physical Society

Prediction of Seismic Wave Arrivals Using a Convolutional Neural Network[1] JORGE GARCIA, LAUREN WASZEK, New Mexico State University — Seismology uses energy from earthquakes to image the deep interior of Earth. Large amounts of seismic data are required in order to obtain detailed observations of the its internal structure; typical datasets comprise over 100,000 seismic records. With the exception of some basic processing methods, compilation of the data is performed by hand using simple visualization software. The most significant and time-consuming task is the identification and picking of seismic phases. Previous attempts at automating this procedure involve algorithms that generally underperform compared to a human expert. However, even among human-compiled datasets, consistency of phase arrival across and within datasets is a problem. The variation in decisions results in disagreement between obtained images, and subsequent interpretation of Earths structure and processes. We employ a Convolutional Neural Network (CNN) to predict the arrival time of the mantle shear-wave phases in a seismogram in an effort to accelerate and make consistent the task of data processing. We expand on this by implementing a committee of multiple CNNs to predict both the correct arrival time and the polarity of an arriving seismic phase. We compare the results obtained from the model to those of an experienced seismologist.

[1]Work supported by NSF Award 1853662, New Mexico Alliance for Minority Participation

Jorge Garcia
New Mexico State University

Date submitted: 12 Sep 2019 Electronic form version 1.4