

Simulating 3C273 Light Curves using Machine Learning Algorithms

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1 Introduction

The aim of this work is to develop an learning algorithm based on Neural Network to learn the behavior pattern of an quasars better sampled light curves to predict the missing data on an less well sampled light curves. To accomplish this, we used data from the Quasar 3C273 obtained from 3 different Radio Observatories such as the Michigan Radio Observatory (UMRAO) in USA operating at 4.8, 8 and 14.5 GHz; Itapetinga Radio Observatory (ROI) in Brazil at 22 and 43 GHz and the Metsähovi Radio Observatory in Finland operating at 22 and 37 GHz.

We've collected all the data and organized it and, as reported by Marscher and Gear (1985), all the events on the light curves occurred later in time and were attenuated when studied at lower frequencies. All the light curves were normalized to a single event, achieving better correlation between them. We also found a patter between lag of the days from this event.

After the normalization, data from the better sampled light curve were splitted into training and test sets. The first was gave to the algorithm to make the model wich was used on the second set to predict the data on it. Once the model did a satsfatory prediction, data from not well sampled light curves were presented to the model so it could make the prediction on them. We used an RNN based on LSTM, which has a different gate, the forget gate, which enable the RNN to learn and remember patterns for longer steps. This approach gave good results so far with data been predicted at daily rates and low deviation.