Predicting Maximum Circular Velocity in a sample of MaNGA galaxies using artificial intelligence

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Abstract

We use artificial intelligence algorithms to predict the Vmax (Maximum circular velocity) value in a galaxy sample of 200 resolved MaNGA and CALIFA galaxies with velocity fields, using different properties, like stellar mass, circular velocity at effective radius and star formation rate to build the training sample. Here we present the predicted results from apply a Random Forest algorithm and a Cross validated artificial neural network to our sample.

K-Fold CV

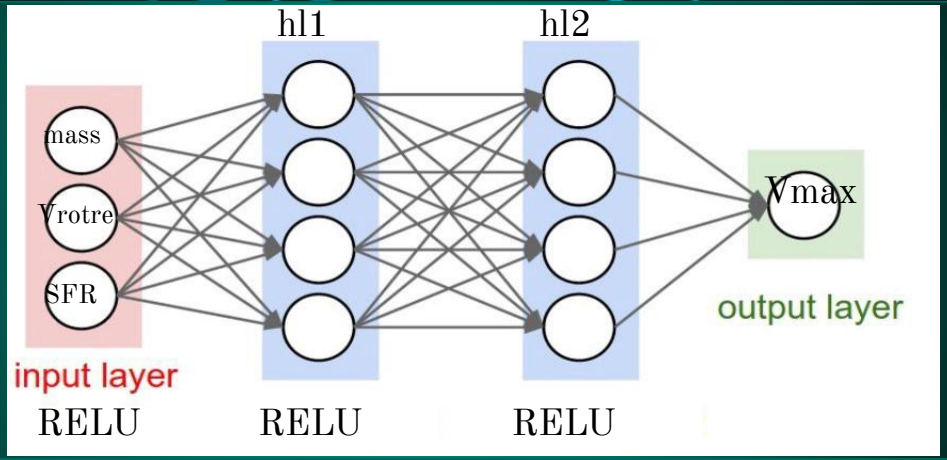

fig 1: Schematic representation of the neural network used in this work

Artificial Neural Network

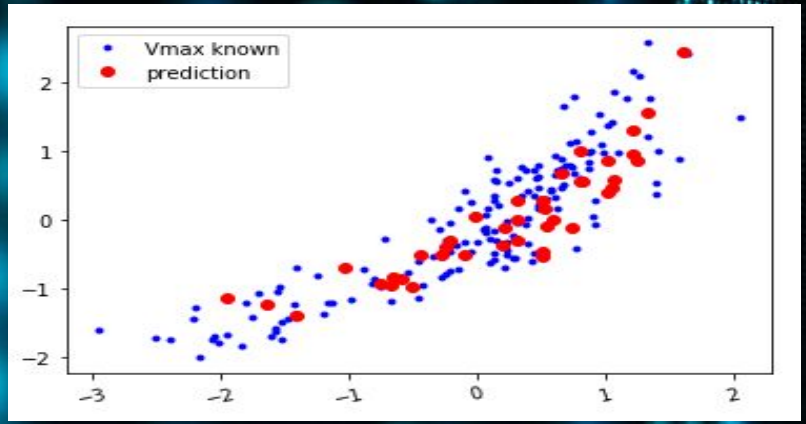

fig 2.

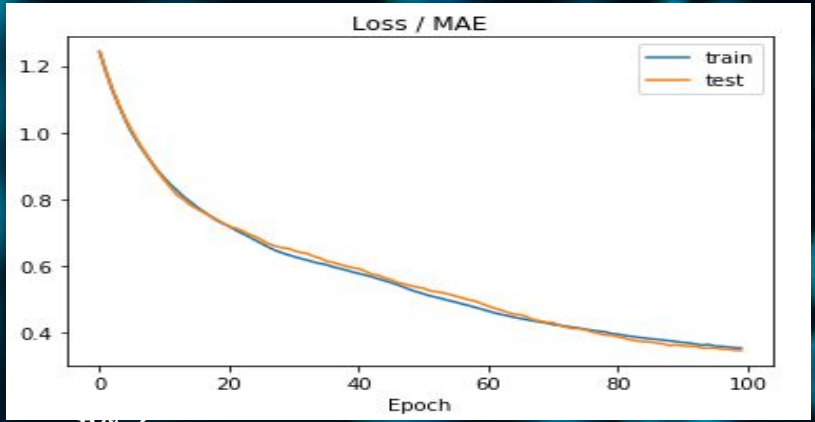

fig 3.

Random Forest

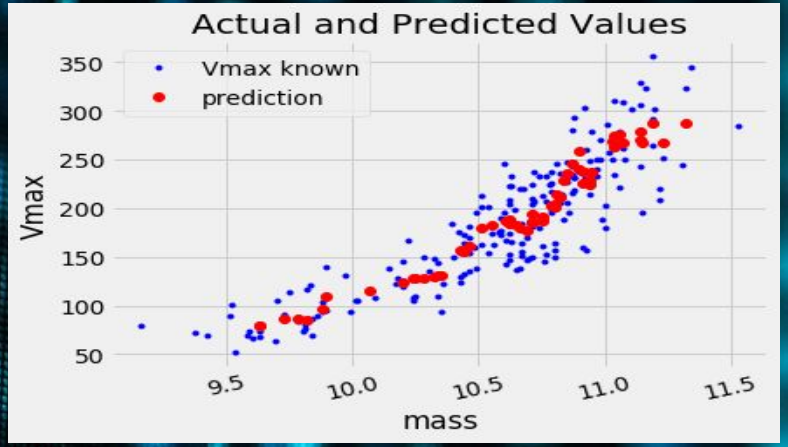

fig 4.

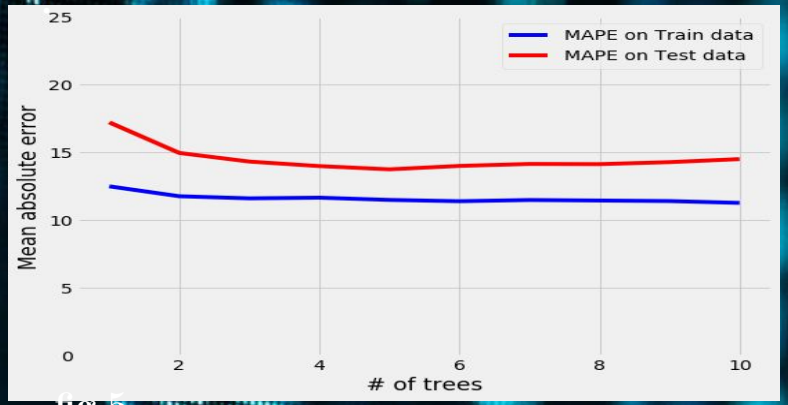

fig 5.

Conclusions

We apply different artificial intelligence algorithms to a well resolved galaxy sample from MaNGA and CALIFA catalogs with the main goal of estimate the unknown Vmax value on new galaxy data sample from this catalogs. The results from this part of the project are our first try of implementing this kind of techniques to our sample, more work is required to improve the performance of the algorithms, but it is important to highlight that although the sample is small our results show that these techniques are an efficient and capable method of making predictions that can compete with the techniques that are commonly used.

References

[1] The Fifteenth Data Release of the Sloan Digital Sky Surveys: First Release of MaNGA-derived Quantities, Data Visualization Tools, and Stellar Library
[2]Ng, Andrew, Machine Learning (Coursera)
[3] Ng, Andrew, Deep Learning Specialization (Coursera)