

Deep Convolutional Neural Networks based Galaxies Classification

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ABSTRACT

In this Project, The neural network architecture for galaxies classification is presented. The galaxy can be classified based on its features into a main three categories Elliptical, Spiral, and Irregular. This paper presents an new approach for an automatic detection of galaxy morphology from datasets based on the image-retrieval approach. The galaxy can be classified based on its features into a main three categories Elliptical, Spiral, and Irregular.

Keywords: Galaxies Classification, Deep Convolutional Neural Networks, Computational Astrophysics

I. INTRODUCTION

Studying the types and an properties of the galaxies are important as it offers important clues about the origin and the development of an universe. The classification of the galaxy is an important role in studying the formation of the galaxies and an evaluation of our the universe. Galaxy morphological classification is an system used to divide the galaxies into groups based on their visual appearance. There are several schemes in use by which the galaxies can be classified according to their morphologies.

Galaxy classification is used to help the astrophysicists in facing this challenge. It is done on the huge databases of information to help the astrophysicists in testing theories and finding new conclusions for explaining the physics of processes governing galaxies, star-formation, and the evaluation of universe.

Historically, galaxies classification is an matter of visually inspecting two-dimensional images of an galaxies and categorizing them as they appear. Even though expert human classification is somewhat reliable, it is simply too time consuming for the huge amounts of astronomical database taken recently

because of the increase in the size of a telescopes and the CCD camera have has produced extremely large datasets of images, for example, the Sloan Digital Sky Survey (SDSS). an long-term goal for astrophysicists. These data is too much to analyze manually feasible. Galaxy classification is based on the images and spectra. This classification was considered However, the complicated nature of the galaxies and the quality of images have made the classification of the galaxies challenging and not accurate . Galaxy classification system helps astronomers in the process of grouping the galaxies per their visual shape. The most famous being the Hubble sequence Hubble sequence is considered one of the most used schemes in the galaxy morphological classification. The Hubble sequence was created by the Edwin Hubble in 1926 .

In the past few years, advancements in a computational tools and algorithms have started to allow automatic analysis of galaxy morphology. There is several machine learning methods are used to improve an classification of galaxy images. Prior researchers do not achieve an satisfying results. In this paper, the authors perform automated morphological galaxy classification based on the machine learning and image analysis. They depend on

the feed-forward neural network and an locally weighted regression method for classification. With the huge increase in the processing power, a memory size and the availability of powerful GPUs and large datasets, it was possible to train deeper, the larger and more complex models. The machine learning Researchers had been working on the learning models which included learning and extracting the features from images. Deep Learning has achieved significant results and a huge improvement in visual detection and the recognition with a lot of categories. Raw data images are used deep learning as input without the need of expert knowledge for an optimization of segmentation parameter or feature design.

II. METHODS AND MATERIAL

2.1. EXISTING SYSTEM

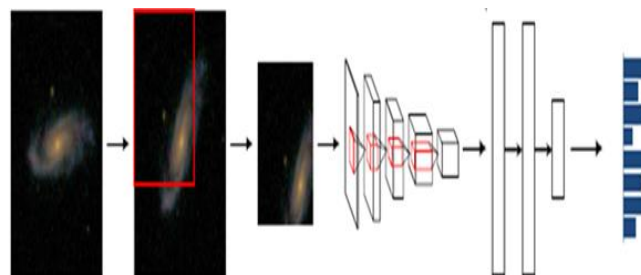
Several machine learning methods for star/galaxy separation based on photometric analysis from catalogs. The experiments revealed that in terms of accuracy, most of the analyzed and explored methods outperformed the baseline method Zero. Among them, both NN and RF achieved good performance.

2.2 PROPOSED SYSTEM

The classification of galaxies based morphologies is considered one of the motivating topics of interest to researchers. a robust deep convolutional neural network architecture for galaxies classification was introduced.

Galaxies to be classified based on their morphological features as one of three types: Elliptical, Spiral, and Irregular. The proposed architecture convolutional layer for features extraction with some filters and two principles fully connected layers for classification. Image augmentation techniques were applied to the training data and included rotation, reflection, cropping and Gaussian noise.

2.3 SYSTEM ARCHITECTURE



Figuer 1

III. RESULTS AND DISCUSSION

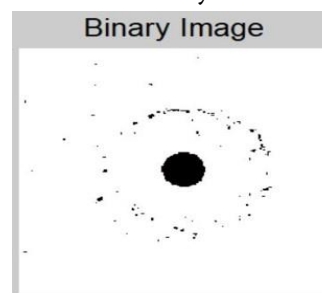
The output is generated by three stapes using this system:-

1] Original colour image processing: Here the image taken from the database is scanned and processed.



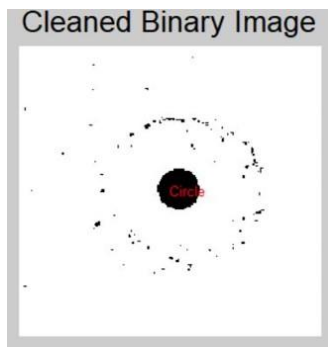
Figuer 2

2] Conversion of Binary image: Here the original image is converted into binary form of image.



Figuer 3

3] Clearing binary image: Here the binary form of image is cleared to it it view clear ., this make the image easy to further processing.



Figuer 4

After this ., the shape of galaxy is shown by the system. This also shows shapes of all the objects in the input original image.

IV. CONCLUSION

The deep learning approach led to a powerful shape detection system for galaxy that performs better than state-of-the-art systems. Extend our system by using deep learning and correctly process the extracted features. The galaxy can be classified based on its features into the main three categories Elliptical, Spiral, and Irregular..

V. REFERENCES

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