

AI in Discovery and Interpretation of Astronomical Images

Gayathri Valiveti, Jai Sandeep Kumar MR, Kotera R Priya , M Nirmala*

*Associate Professor, Computer Science and Engineering, New Horizon College of Engineering, Bangalore,
Karnataka, India

Department of Computer Science, New Horizon College of Engineering, Bangalore, Karnataka, India

ABSTRACT

Image processing of astronomical images, methodology used for the same and level of processing in detail. How images are capture and presented. Before presenting the images, it must contain precision of patterns if any and identification of necessary stars, meteor, planets, patterns etc. is very crucial. AI is used in determining the patterns and the surroundings. These images lead to new discoveries and conclusions for some of the discoveries. Astronomical images have played a crucial role in the discovery of many celestial objects and phenomena throughout history

Keywords: Image processing, 3-D descriptions, identify patterns, spectroscopy.

I. INTRODUCTION

The use of AI in the discovery and interpretation of astronomical images has become increasingly important in recent years. AI algorithms can help researchers identify patterns, classify objects, and make predictions based on large datasets of astronomical images.

One of the key applications of AI in this field is in the identification and classification of astronomical objects. For example, AI can be used to identify and classify galaxies, stars, and other celestial objects based on their characteristics such as their shape, size, and spectral properties. This can help astronomers to more accurately classify objects and understand their properties.

Another area where AI is being used in astronomy is in the detection of transient events such as supernovae and gravitational waves. AI algorithms can be trained to identify these events in large datasets of astronomical images, helping astronomers to quickly and accurately identify and study these phenomena.

Another area where AI is being used in astronomy is in the detection of transient events such as supernovae and gravitational waves. AI algorithms can be trained to identify these events in large datasets of astronomical images, helping astronomers to quickly and accurately identify and study these phenomena.

Overall, the use of AI in the discovery and interpretation of astronomical images has the potential to revolutionize our understanding of the universe. By enabling researchers to quickly and accurately analyse large datasets of images, AI can help to uncover new insights and advance our knowledge of the cosmos.

II. METHODS AND MATERIAL

The most common method astronomers use to determine the composition of stars, planets, and other objects is spectroscopy. Each element absorbs light at specific wavelengths unique to that atom. When astronomers look at an object's spectrum, they can determine its composition based on these wavelengths.

Here are some methods that have been used:

Object detection: Object detection is a method that uses computer vision algorithms to automatically detect and locate objects in astronomical images. This method can be used to detect galaxies, stars, and other celestial objects in large datasets.

Image classification: Image classification is a method that uses machine learning algorithms to classify astronomical images based on their properties, such as their shape, colour, or texture. This method can be used to classify galaxies based on their morphologies, or to identify supernova candidates based on their light curves.

Deep learning: Deep learning is a subset of machine learning that uses artificial neural networks to learn from large datasets. Deep learning can be used to identify patterns and anomalies in astronomical data, such as the detection of exoplanets or gravitational waves.

Data mining: Data mining is a method that involves the extraction of information from large datasets. This method can be used to identify trends and patterns in astronomical data, such as the identification of new galaxies or the discovery of rare celestial objects.

Image registration: Image registration is a method that involves the alignment of multiple images of the same object to create a composite image with higher resolution and detail. This method can be used to enhance the resolution of astronomical images, which can reveal more information about the object being observed.

III. RESULTS AND DISCUSSION

The first known attempt at astronomical photography was by Louis Jacques Mandé Daguerre, inventor of the daguerreotype process which bears his name, who attempted in 1839 to photograph the Moon.

Following are the some of the well-known discoveries made:

1. **Black hole:** The discovery of neutron stars by Jocelyn Bell Burnell in 1967. Cygnus X-1 was the first black identified and confirmed by many scientists in 1971. What is black hole – it is dead star or in urge to dead, it attracts everything in its surroundings. In our solar system there are about 100 billion stars present, in every 1000 stars there will be a black hole present. So apparently there are about 100 million black hole and maybe dozens of them are visible for us.
2. **New moon:** new moon has been discovered around Jupiter. Not one or two ,12 moon has been identified revolving around the Jupiter.
3. **Galaxy:** James Webb Space Telescope (JWST), an international team of astronomers has discovered a new quiescent galaxy. The new observations indicate the presence of mature and large, but compact galaxies

swarming with stars way sooner than scientists' thought was possible. It has been spotted even older galaxies, dating to within a mere 300 million years of the beginning of the universe.

4. **UFO and Aliens:** There are allegations that visitors from other planets. Well still the research and discovery are going on. There was a UFO landing in America who pictures were viral and available over net. And once US govt capture the aliens and communicate with them, this was filmed and related file were maintained as confidential till date. It has been advised by Stephan hawking's not to attempt or try to communicate with aliens as they might be intelligent than us and might overpower us.
5. **Planets:** Astronomical images have been used to discover new planets in our solar system and beyond. In 1781, the planet Uranus was discovered by William Herschel using a telescope, and in 1930, Pluto was discovered by Clyde Tombaugh using photographic plates.
6. **Supernovae:** Astronomical images have also been used to discover supernovae, which are massive explosions that occur at the end of a star's life. In 1987, the first supernova visible to the naked eye in nearly 400 years was discovered in the Large Magellan Cloud, a small galaxy near our Milky Way.
7. **Exoplanets:** Astronomical images have been used in recent years to discover thousands of exoplanets, which are planets that orbit stars outside of our solar system. These discoveries have greatly expanded our understanding of the prevalence and diversity of planetary systems in the universe.



Black hole



Milky way galaxy

IV. CONCLUSION

AI can help us discover new celestial objects by sifting through large datasets of astronomical images, AI algorithms can identify new celestial objects that may have gone unnoticed by human observers. This has led to the discovery of new types of celestial objects and has expanded our understanding of the universe.

AI can help us classify celestial objects more accurately and precise measurements of celestial objects, such as their distance, mass, and composition. This has led to more accurate models of the universe and has helped us to refine our understanding of the physical processes that shape it.

Overall, the use of AI in astronomy has led to many exciting discoveries and has opened up new avenues for exploration and research. As AI technology continues to advance, it is likely that we will make even more ground-breaking discoveries in the years to come.

V. REFERENCES

- [1]. Dan W. Patterson Author, "Introduction to Artificial Intelligence And Expert Systems," published by Asoke k
- [2]. "ESO (European southern observatory) Key Astronomical Discoveries" article <https://www.eso.org/public/science/>
- [3]. "Library of Congress" "UFO and Aliens among us" article. <https://www.loc.gov/>