Tracing Essential Elements of Life using Artificial Intelligence in Jezero Crater

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Introduction

Search of life beyond earth is always a curiosity to humans which create paths to discovery. Mars, the next target planet which might have possible life made researchers to show a keen interest which in turn help humans in near future. Jezero crater was formed due to large meteorite attack on mars and this location was chosen by Perseverance rover as it has many veins of ancient rivers.This could have made Jezero crater as a sustainable environment for life to thrive.Impossible things are made possible by humans using Technology.

Artificial Intelligence used in search for Life

Artificial Intelligence plays a vital role to find a future home planet. There are large number of organisms which can be of any form are found on Earth. And these are categorized and database of all possible human know organisms are maintained. Once we find the minerals found at the site on Mars, we can get all suggestive list of organisms that live in such environment in Earth using this database. And AI could help us to train datasets to find the best match.

Process Involved

This entire process could be categorized into various stages as given below. The three important stages are

- Detection of minerals
- Comparison with its analogue site on earth
- Suggestive sediments to look for

This makes the search easier also quick matches can be made without any human intervention.

Detection of minerals:

Every riverbed on earth contains possible traces of phosphorus and nitrogen as the organisms decay in the life cycle. Similarly we could analyze the deep inside of the Jezero crater using wavelength of each element and the list of minerals are noted.

Comparison with the analogue site:

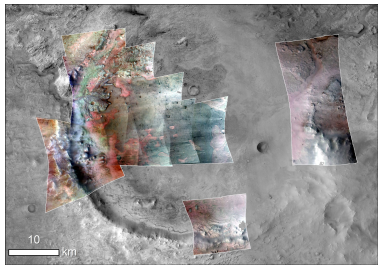
Each element found with its proportion is noted and compared with the database of the analogue sites found related to it on earth. This database should contain all possible intersection of sites and from the list the top site which has major similar elements are given out.

What to look for:

The final process gives out the possible list of organisms that was found and now exists in the analogue site form the database by comparing the types of elements found. Now based on this organisms list we can conclude what kind of organisms sediments to search for.

Sample Search

To begin with our sample search we tried to find out the minerals which are present in the Jezero site using NASA's Mars Reconnaissance Orbiter data.[2]



[3] Minerals highlighted in Jezero crater

This Image shows the minerals detected in the Jezero site and the green color indicates the presence of Carbonates which are rich in magnesium and iron.Using this data we move on to next stage of the process.[1]

Jezero crater region is similar to the Mississippi river site on earth. This gives the clue to find out the possible life sediments to search for.[4]

Mississippi river site which is the flourishing site of different coloration fishes which live on rocky habitats. And so there are possibilities to find sediments of any creatures to be found on the rocky terrain in and around the crater.

Future Scope

As sample search resulted with possible creatures to be searched for in that particular kind of environment this methodology can be used in making our find easier.This process could be used to bring out the sediments which could in turn show the forms of life existed or thriving now. Thus life can be of any form and thrive in any environment and finally the challenge is how we find them. The only way to find answer to a search is to know what we really look for.

References

[1]LandingSiteWorksheet_Jezero_final.pdf,(2020) marsnext.jpl.nasa.gov

[2]Nicolas Mangold, Gilles Dromart, Veronique Ansan, Francesco Salese, Maarten G. Kleinhans, Marion Masse, Cathy Quantin-Nataf, Kathryn M. Stack(2020) ASTROBIOLOGY Volume 20, Number 8,DOI:10.1089/ast.2019.2132

[3]Image Credit: NASA/JPL-Caltech/MSSS/JHU-APL/Purdue/USGS

[4]https://mars.nasa.gov/mars2020/mission/science/landing site/