



## Transforming Marine Science with Artificial Intelligence

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**ABSTRACT:** This research paper consists of topic Transforming Marine Science with Artificial Intelligence (Oceanography) which means the study of the ocean and the deep sea. A.I means in this we use the Tangible Knowledge *i.e.* Observation, Experience by using various data sets, Pattern formation that is defined in various packages, Decision making which will make a new discovery. Artificial Intelligence (A.I) algorithms enhance the performance of data management, clarify underwater landscapes, rock patterns. AI based (robotics) submarines makes easy deep-sea mapping and research. This A.I based system make the Marine Science Research more accurate and much reliable.

**Keywords:** AI, Marine Science, Deep-sea Mapping, Rock pattern, Clarify underwater resources.

### INTRODUCTION

This research paper plays the crucial role in the ocean life this research paper consists of topic Transformation Marine Science with Artificial Intelligence (An Exploration of AI's Role in Oceanography). AI helps to analyze large-scale of ocean and deep-sea data efficiently. It assists in mapping unexplored oceanic as well as deep-sea regions. This will helps in finding deep sea creatures and make research on them. Nowadays the Ministry of Earth Science Undertaking Government of India launches the (Mission Matysa 6000) to find the Deep-Sea creatures, Deep Sea exploration and find valuable resources in ocean. This mission of India found a creature which name is "Dark Sea Devil Fish" in 640 m deep sea this fish has the light on her head. This research makes the Deep-Sea mapping reliable and much cost effective. We use the VIAME package in our research because this is an open-source software package for automated image analysis in marine and ocean science, it utilizing computer vision and machine learning for object detection, classification as well as tracking. The pitfalls of poor interpretability of AI techniques have led more scholars to study AI techniques combining physical information (Schneider *et al.*, 2022). With the advancement of technology and the advent of big data in recent years, the storage

volume of Earth system data has far exceeded tens of petabytes. Ocean observation is the foundation for the study and use of the ocean, which has a deep historical foundation, and in recent decades remote sensing technology (Boukabara *et al.*, 2019) and sensor network technology (Lu *et al.*, 2019) have developed rapidly. The authors (Chengcheng and Ge 2018) describe the development of ocean big data acquisition, analysis, and application.

### RELATED WORK

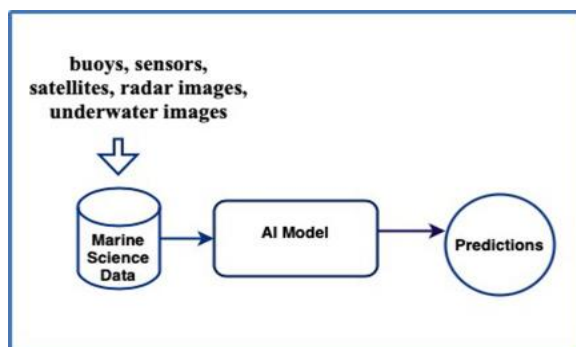
The first global observations of the ocean date back to the Challenger expedition in 1873 AD (Sonnewald *et al.*, 2021), which first studied the global distribution of ocean depth, temperature, and salinity. We use the VIAME package (Open-source software package) because it utilizing computer vision and machine learning for object detection and tracking. By the 1940s, humanity introduced radar precision navigation systems for submarine detection in World War II, which also brought a revolution in ocean observation. In the second half of the 20th century, several countries launched many satellites for ocean observation, such as the first artificial satellite launched by the Soviet Union in 1957 and the Seasat satellite launched by the United States (Song *et al.*, 2023).

Table 1: Summary of Models.

VIAME PACKAGE	CNN	RNN
VIAME package in our research because this is an open-source software package for automated image analysis in marine and ocean science	CNN is a deep learning algorithm which consist of photos and videos which helps in analyzing the visual data.	RNN is a neural network it enhances the performance of system by enhancing the output based on coming output (come from CNN)
This is used to analyze the image, tracking, scaling	It is used to forecast the phenomenon and make them more reliable	It makes the reliable and accurate output based on the last output
It is an open-source software package	It is deep learning algorithm	It is a neural network

It is used to analyze the ocean images which are already exist in this package	This is a deep learning algorithm which analyze the ocean data and give the reliable output	This is an neural network which correct the output and make it much reliable and accurate
It predicts the image and provide the resource description	It predicts the deep-sea mapping and phenomenon like Tsunami, movement of tectonic plates	It helps in analyzing the result more deeply
This is free of cost and can be easy to use for beginners	This may give difficulty to beginners but it provides accurate result	This model makes the system more complex but give the accurate output

**Flow Chart of Application of Artificial Intelligence in Marine Science.** This flow chart states that we use buoys, sensors, radar images, underwater images which exists in VIAME package. We use the various data sets, parameters, Tangible knowledge *i.e.* Experience as well as Observation which make the new discovery for the whole world.



**Finding and Suggestion.** VIAME package in our research because this is an open-source software package for automated image analysis in marine and ocean science, it utilizing computer vision and machine learning for object detection, classification as well as tracking. This will help in deep sea mapping and find valuable resource. Viame package consist of thousand of images of deep-sea which will help in Observation, Experience by using various data sets, Pattern formation. CNN can identify extreme forecasting phenomena such as typhoons with higher accuracy than LSTM and deep MLP (Patil and Iiyama, 2022a). For marine ecology, the chlorophyll-a prediction can be performed using two different scales of CNN models for overall and local training (Jin *et al.*, 2021), and the average RMSE of CNN Model II ( $7 \times 7$ ) was 0.191, which is significantly lower than that of CNN Model I ( $48 \times 27$ ), which was 0.463. Since CNN alone extracts only spatial feature information, it does not work excellently in ocean element forecasting with mainly spatial and temporal features.

RNN is a neural network with a “memory” function, specifically in that the output of a time series is also correlated with the previous output. It was designed to track the temporal dependence between the sequences of ocean elements, making RNN useful in marine environmental forecasting. The correlation coefficient of RNN is higher than that of a feed forward neural network when performing wave prediction (Mandal and Prabakaran 2006).

## CONCLUSIONS

This research paper concludes the making of high performable system which helps in deep-sea mapping, finding valuable resources and the finding hard rock pattern underwater. VIAME package consist of large scale of images which helps in tracking, scaling as well as detection. And CNN makes the forecasting phenomenon which can be more accurate as well as reliable this model consists of various ecological as well as marine science pictures which helps in various detection. RNN is a neural network it makes correct the output given last times and make it more reliable and accurate. This research helps in country growth by finding precious sea minerals like precious ore metals. Oceanography is basically a term in which we find rare species which is about to die or disappear. In which the Marine Biologists who discover these species had a chance of dying while entering in the deep sea so, to overcome from this we introduce special robotics machines which are based on AI who dive in the deep sea instead of Marine Biologists and go as long as deep for discovering the rare species and earth metals. Through this knowledge of oceanography, we know about the deep-sea creatures who live on this ecosystem. In deep sea there are many levels in which they live top level, middle level and last the bottom level. These creatures in bottom level have different type of living style. This system helps in making of new discovery.

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