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Iceberg Detection in Satellite Images Using IBM Watson Studio

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Abstract
Ship navigation and offshore installations are seriously harmed by icebergs. As a consequence of this, there is a significant interest in timely and extensive localization. Satellite Synthetic Aperture Radar (SAR) images are one of the most commonly used data sources for operational ice conditions and iceberg occurrences due to their independence from daylight and cloud cover. The most common image spatial resolution for iceberg monitoring is between a few and 100 meters. Processed SAR data are characterized by speckle noise, which gives the images a grainy appearance and makes it extremely difficult to identify icebergs. The methods of satellite monitoring of dangerous ice formations, such as icebergs in the Arctic Sea, pose a threat to the safety of Arctic Shelf navigation and economic activity. The creation of a model that automatically determines whether a remotely sensed object is an iceberg is the primary objective of this project. An iceberg is frequently mistakenly categorized as a ship. Because lives and billions of dollars in energy infrastructure are at risk, the algorithm needed to be extremely accurate

1. Introduction

Icebergs in open water icebergs show bright spots against a dark background in optical images higher wind reduces the contrast between open water and icebergs .Difficult to distinguish icebergs from a background in optical images if only backscatter information is available. Iceberg detection is found to be more critical in the previous researchers. High quality satellite monitoring of dangerous ice formations is critical to navigation safety and economic activity in the regions. The satellite images play a crucial role in the identification of the icebergs. In this manuscript, a convolutional neural network (CNN) model is proposed for the iceberg detection from the satellite images. It is based on the satellite dataset for target classification and target identification.

The iceberg detection is based on the statistical criteria for finding the satellite images. This model is used to identify automatically whether it is remote sensed target is iceberg or not. Sometimes the iceberg is wrongly classified as ship. This model is done to make accurate about the changes in the detection. At present, numerous organizations and organizations utilize ethereal observation and shore-based help to screen natural conditions and evaluate dangers from ice shelves. Be that as it may, in remote regions with especially unforgiving climate, these strategies are not attainable, and the main feasible checking alternative is through satellite. Progression of earth perception with satellites utilizing remote detecting has

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opened another road of earth science examine through contribution huge measure of opportunities for better comprehension of the world's condition and aiding quality dynamic.
IBM Watson Studio is a piece of AI systems that is utilized by the layers to draw out the more significant level highlights from the crude info. So as to get data, remote detecting gave for examining the earth by satellite or high-flying airplane. Recognizing remote detecting pictures gives the better and more noteworthy test for the savvy examine researchers to find the Iceberg acknowledgment in the specific way. Remote detecting frameworks is utilized to distinguish chunks of ice are housed on satellites over the earth. The satellite star grouping is utilized to screen the seas. The satellites catch the pictures at the given area of Earth's.
Three Situations
Icebergs in open water: icebergs will show bright spots against a dark background in optical images, higher wind reduces the contrast between open water and icebergs.
Icebergs in drifting ice: icebergs will create tracks in the drifting ice if there are larger floes of consolidated ice. Difficult to distinguish icebergs from a background in optical images if only backscatter information is available

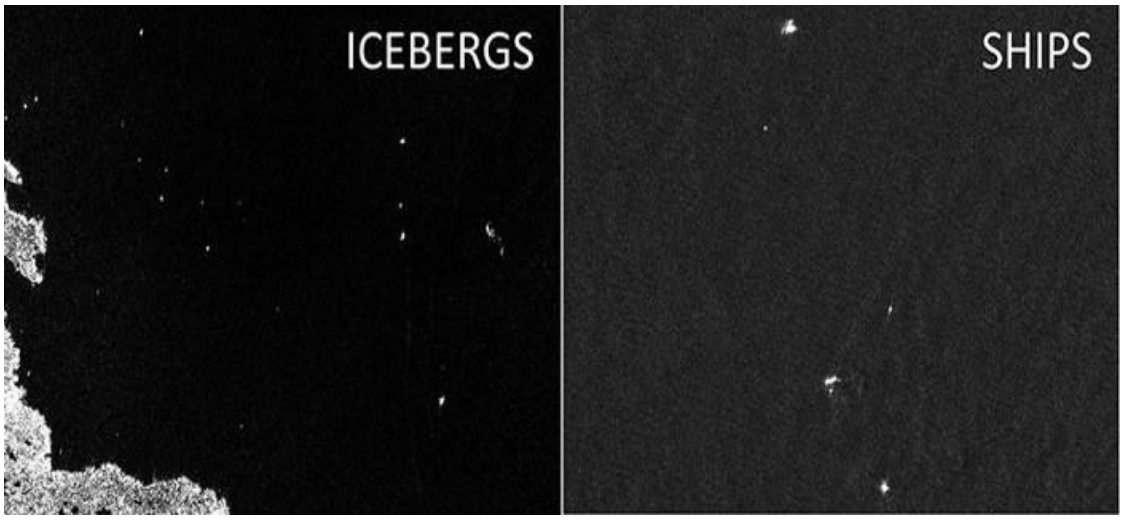

Fig.1 Iceberg detection in satellite images

2. Literature Review

IBM's software platform for data science is Watson Studio, formerly known as Data Science Experience or DSX. A workspace on the platform houses a variety of tools for data science collaboration and open source.
A data scientist can collaborate on a project in Watson Studio with a group of people who all have access to various analytics models and languages (R/Python). In a safe and controlled environment, Watson Studio integrates standard open source tools like R Studio, Spark, and Python with additional tools like a managed Spark service and data shaping facilities.
On-premises or cloud-based data sets are accessible through Watson Data Platform through Watson Studio. In addition, there is a large community on the platform as well as embedded

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resources like articles on the most recent developments in data science and public data sets. The platform is available as a desktop, cloud, and on-premises option.

Data scientists, developers, and analysts can build, run, and manage AI models, as well as optimize decisions anywhere on IBM Cloud Pak® for Data, with IBM Watson® Studio. On an open multicloud architecture, unite teams, automate AI lifecycles, and accelerate time to value. Bring together IBM's ecosystem of tools for code-based and visual data science with open source frameworks like PY Torch, Tensor Flow, and SCIKIT-learn. Utilize the CLIs, JUPYTER notebooks, and JUPYTER Lab, or Python, R, and SCALA Simplified Analysis: Through automation, IBM Watson helps you quickly comprehend what your data wants to convey to you. The automation takes care of everything so that you can spend more time analyzing your data and gaining new and unexpected business insights.

Predictive Machine Learning: It is a service where users upload data and use minimal data to build predictive or descriptive models. You can get an automated predictive analysis service from IBM Watson that shows you the driving outcomes automatically.

Advanced Analytics that are accessible: You get quick access to your data with IBM Watson. It connects without requiring complicated data preparation. It takes away the complicated, time-consuming tasks and supports your decision with reliable data.

Analysis in One Click: With the help of automatic visualizations, IBM Watson provides analysis and data recovery with a single click. With just one click, it senses data discovery. In your dashboards, you can also use automatic visuals. With one-click analysis, you can access your data in a single click.

Smart Data Acquisition: A smart data discovery solution needs to provide a comprehensive view, automated insights, and a conversional interaction. It provides you with a comprehensive understanding of your data while being simple to use and analyze. In your own words, IBM Watson will provide you with the most intriguing patterns for your database. Everything contains data; all you have to do is locate the data that is revealing to you.

Dashboards for self-service: IBM Watson also has this important feature. Using this feature, you can easily create a dashboard from the visualizations you saved during data discovery to share your insights.

Text to Speech: It's also known as a system for speech recognition. For quick comprehension, this feature can easily convert the voice or audio into written text.

Speech to Text: The opposite of speech to text is it. It turns written text into voice and audio in a variety of languages. It gives your system the ability to talk like a human.

Recognition of Images: You can use machine learning to analyze the visual content of images and videos with this feature of IBM Watson.

Conceptual Analysis: Unlike traditional text matching, it lets you look deeper into the idea or content of your input.

Analyses of Trade-Offs: Businesses can use this feature of IBM Watson to balance multiple goals when making decisions. You can avoid options that aren't necessary and choose the best options from many with the help of trade-off analytics objectives

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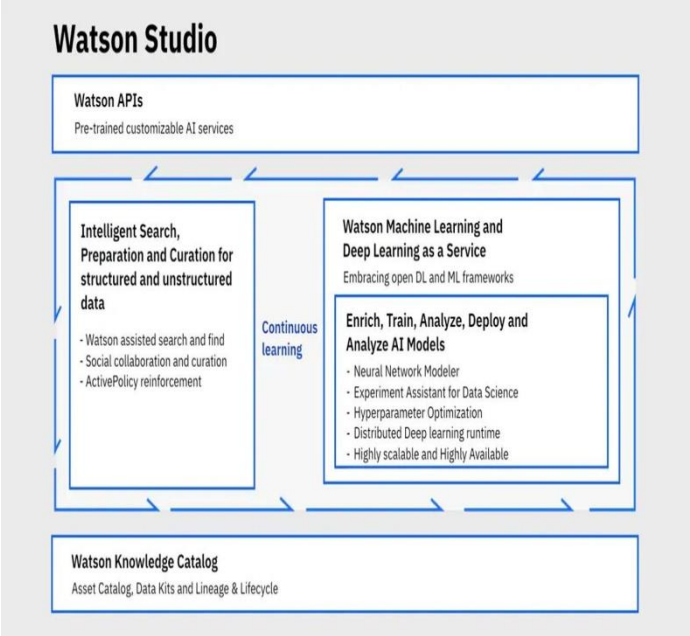

Fig.2 Build and train AI models all in one integrated circuit

3. Proposed System

Ship navigation and offshore installations are seriously harmed by icebergs. As a consequence of this, there is a significant interest in timely and extensive localization. Satellite Synthetic Aperture Radar (SAR) images are one of the most commonly used data sources for operational ice conditions and iceberg occurrences due to their independence from daylight and cloud cover. The most common image spatial resolution for iceberg monitoring is between a few and 100 meters. Processed SAR data are characterized by speckle noise, which gives the images a grainy appearance and makes it extremely difficult to identify icebergs. The methods of satellite monitoring of dangerous ice formations, such as icebergs in the Arctic Sea, pose a threat to the safety of Arctic Shelf navigation and economic activity.

The creation of a model that automatically determines whether a remotely sensed object is an iceberg is the primary objective of this project. An iceberg is frequently mistakenly categorized as a ship. Because lives and billions of dollars in energy infrastructure are at stake, the algorithm had to be extremely accurate. IBM Watson Studio is heavily dependent on data; an "AI" cannot learn without data. Algorithm training is made possible in large part thanks to this crucial component. We need a training data set for projects in IBM Watson Studio. It is the actual data set that is used to train the model to do different things.

In this, we will gather information for the construction of our project. The training folder will be created, and the testing folder will be created. The images in the training folder will be used to build the model, while the images in the testing folder will be used to verify our model.

DATA PRE-PROCESSING The process of cleaning the raw data, or the data that is collected in the real world and transformed into a clean data set, is known as data pre-processing. To

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put it another way, when data is gathered from various sources, it is gathered in a raw format, making it impossible to analyze it.

As a result, a set of procedures known as data pre-processing is carried out to transform the data into a small, clean data set. Establish Train and Test folders, each containing images of ships and icebergs. To receive the maximum number of features, each category folder must contain at least 100 images. The images that will be used to build the model will be preprocessed in this. Zooming, shearing, and flipping are all part of image pre-processing to improve the model's durability after it has been built. The KERAS package will be utilized for image pre-processing. In order to make the model adaptable to a variety of image types, import the Image Data Generator and create an instance for it, such as shearing, rescaling, zooming, etc

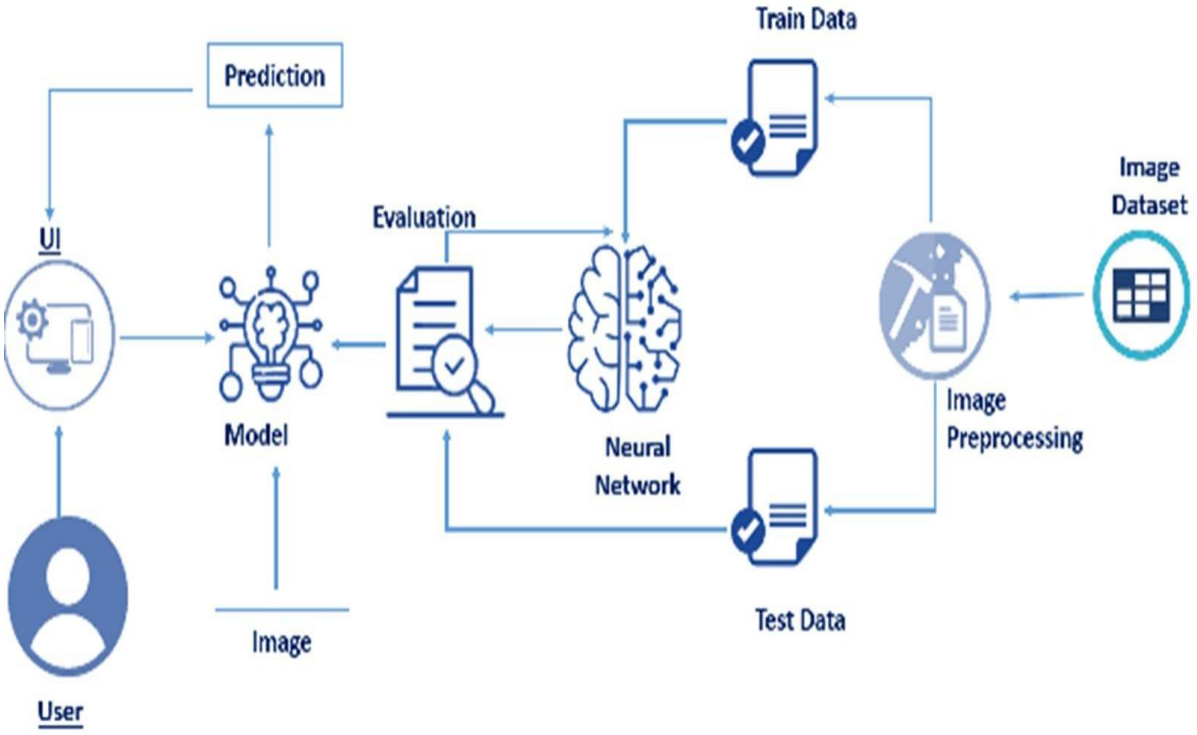

Fig.3 Proposed Method

4. Conclusion

The set-up of the needed hardware and middleware for the ROS system and the TurtleBot3 went well. Also the mentioned use cases could be tested and evaluated successfully regarding performance, accuracy and feasibility. We were overall satisfied with those results and the current ecosystem providing libraries and modules for the development of service robot applications. I think this is one of the great examples where IBM WATSON STUDIO can be used to solve a challenging real-world problem. If we are able to detect and segment icebergs in an image, it would be of great help to the logistics and transportation team in northern countries like Sweden, Norway and Canada. It could bring a whole new dimension of

transport for container ships and vessels by tracking icebergs from satellite images and videos in real-time

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