ICEBERG DETECTION IN SATELLITE IMAGES USING IBM WATSON STUDIO

AN INDUSTRY ORIENTED MINI PROJECT REPORT

Submitted to

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

In partial fulfilment of the requirements for the award of the degree of

BACHELOR OF TECHNOLOGY

IN

COMPUTER SCIENCE AND ENGINEERING

Submitted by

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2019– 2023

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CERTIFICATE OF COMPLETION

AN INDUSTRY ORIENTED MINI PROJECT

This is to certify that the Industry oriented mini project entitled **"ICEBERG DETECTION IN SATELLITE IMAGES USING IBM WATSON STUDIO"** is being submitted by ***SHAHEDA NAAZ(19UK1A0541),NARAHARISOWMYA(19UK1A0544),GUDLAPRIYA(19UK1A0547), MAKKALA PRASHANTH KUMAR(19UK1A0558)*** in partial fulfilment of the requirements for the award of the degree of **Bachelor of Technology** in **Computer Science and Engineering** to **Jawaharlal Nehru Technological University Hyderabad** during the academic year **2022-23**, is a record of work carried out by them under the guidance and supervision.

Project Guide
MS.M.SWETHA
(Assistant Professor)

Head of the Department
Dr. R. Naveen Kumar
(Professor)

ACKNOWLEDGEMENT

We wish to take this opportunity to express our sincere gratitude and deep sense of respect to our beloved **Dr.P.PRASAD RAO,** Principal, Vaagdevi Engineering College for making us available all the required assistance and for his support and inspiration to carry out this Industry oriented mini project in the institute.

We extend our heartfelt thanks to **Dr.R.NAVEEN KUMAR**, Head of the Department of CSE, Vaagdevi Engineering College for providing us necessary infrastructure and thereby giving us freedom to carry out the Industry oriented mini project.

We express heartfelt thanks to Smart Bridge Educational Services Private Limited, for their constant supervision as well as for providing necessary information regarding the industry oriented mini project and for their support in completing the industry oriented mini project.

We express heartfelt thanks to the guide, **Ms.M.SWETHA** Assistant professor, Department of CSE for his constant support and giving necessary guidance for completion of this Industry oriented mini project.

Finally, we express our sincere thanks and gratitude to my family members, friends for their encouragement and outpouring their knowledge and experience throughout the thesis.

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ABSTRACT

The main objective of this blog is to develop methods for detecting icebergs using satellite radar data and high spatial resolution images in the visible spectral range. The methods of satellite monitoring of dangerous ice formations, like icebergs in the Arctic seas represent a threat to the safety of navigation and economic activity on the Arctic shelf.

The developed method of iceberg detection is based on statistical criteria for finding gradient zones in the analysis of two-dimensional fields of satellite images. The approaches proposed to detect icebergs from satellite data allow improving the quality and efficiency of service for a wide number of users with ensuring the efficiency and safety of Arctic navigation and activities on the Arctic shelf.

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1. INTRODUCTION

1.1 OVERVIEW:

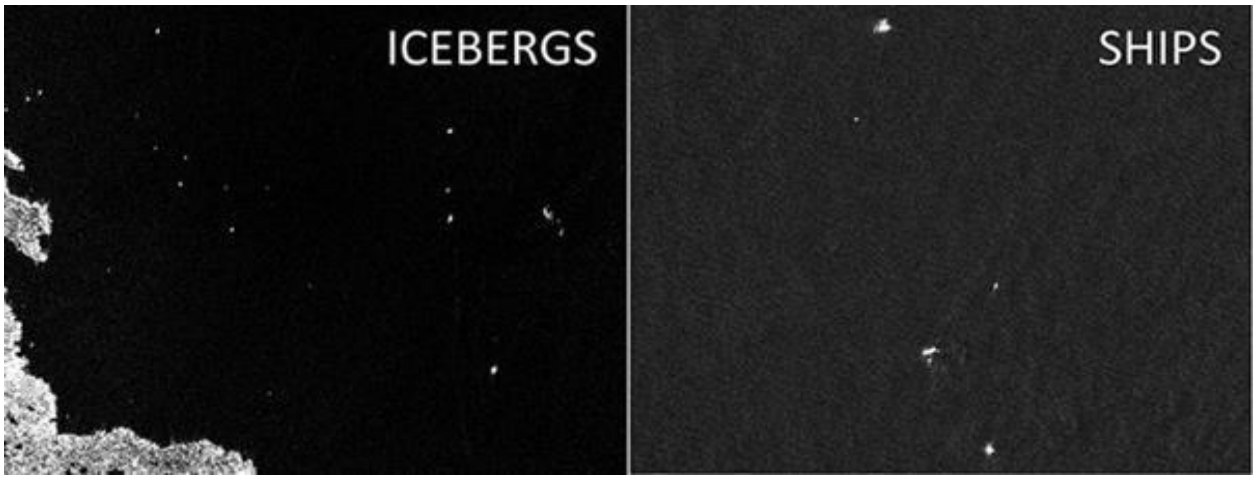
The main objective of this is to develop methods for detecting icebergs using satellite radar data and high spatial resolution images in the visible spectral range. The methods of satellite monitoring of dangerous ice formations, like icebergs in the Arctic seas represent a threat to the safety of navigation and economic activity on the Arctic shelf.

1.2 PURPOSE:

To build an accurate model for the detection of icebergs and successfully using the algorithm in ship navigation systems for avoiding the icebergs and save lives and billions of dollars.

2. LITERATURE SURVEY

Build an algorithm to automatically identify whether a remotely sensed target is an iceberg or not. Often times an iceberg is wrongly classified as a ship. The algorithm had to be extremely accurate because lives and billions of dollars in energy infrastructure are at stake.

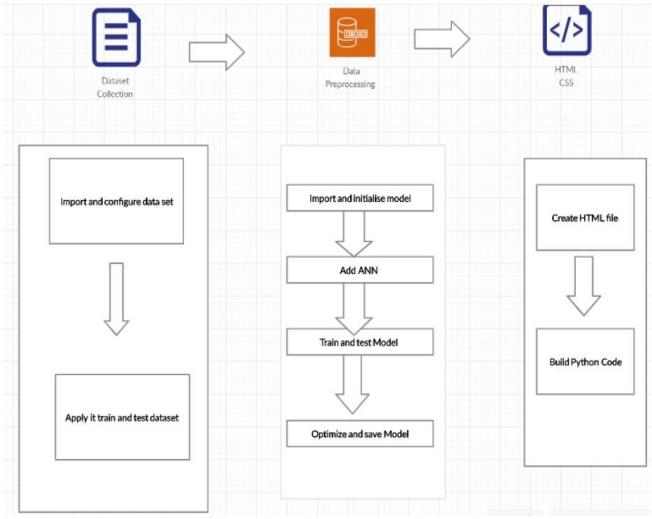


2.2 Proposed Solution:

The developed method of iceberg detection is based on statistical criteria for finding gradient zones in the analysis of twodimensional fields of satellite images. The approaches proposed to detect icebergs from satellite data allow improving the quality and efficiency of service for a wide number of users with ensuring the efficiency and safety of Arctic navigation and activities on the Arctic shelf.

3. THEORETICAL ANALYSIS:

3.1 Block Diagram:



3.2 Hardware / Software Designing:

1. Strategy: Using ANN based neural networks Algorithm to predict the CCPP electrical power output prediction 2. Dataset Creation: Data Collection 3. Data Pre-processing: 4. Importing Data Set

Evaluating Any Null Values

1. Training and Testing Dataset by applying Multi linear regression method.
2. Model Building:

1. Import Model Building Libraries
2. Initializing the model
3. Loading Pre-processing Data
4. Adding ANN and Dense layer
5. Configure Learning Process
6. Train and Test Model
7. Optimize and save the Model

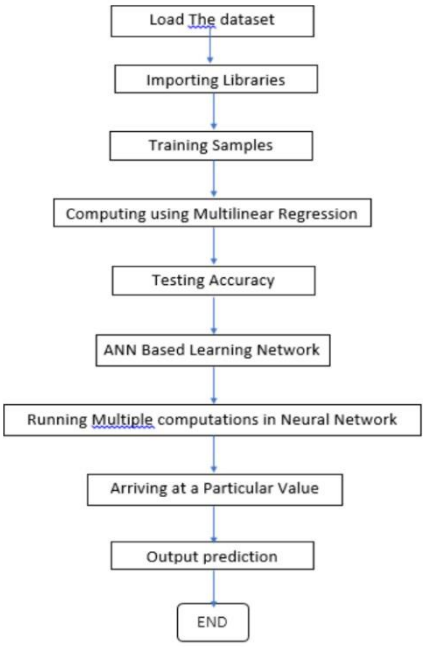
1. Application Building

1. Create HTML file
2. Build Python Code

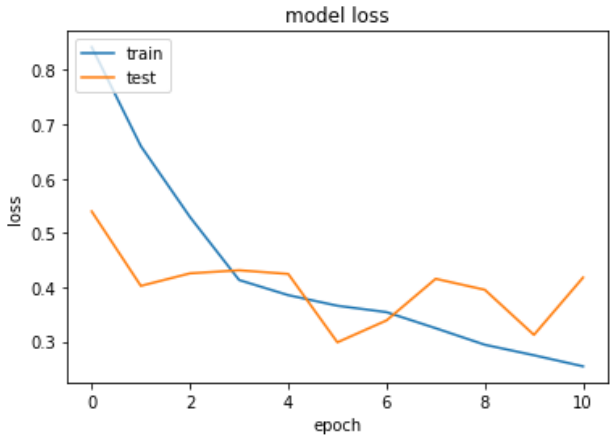
4.EXPERIMENTAL INVESTIGATION:

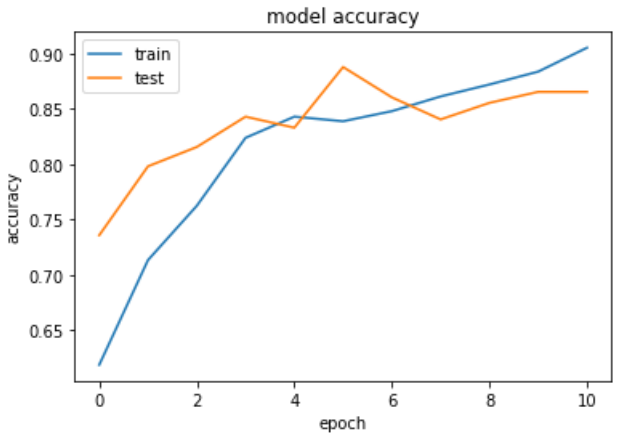
In this project, we have used the Iceberg detection dataset. This dataset will be having two folders i.e. test and train. In this test folder, we will be having two categories namely Iceberg and Ship, in which Icebergs contains the images having Icebergs and ships will contain images of ships, and has the same in the training folder. There are 2 classes of 710images in training set and 2classes of 192 images in test set.

5.FLOWCHART:



6.RESULT:





Both the training as well as the test set loss values are converging quite well. Also the model is able to achieve training and test set accuracy of 90% and 85% respectively in just 10 epochs.

7.ADVANTAGES AND DISADVANTAGES:

ADVANTAGES:

- We are able to detect Icebergs through satellite images and will be very useful for ship navigation and transportation vessels.
- It is easy to use and Implement
- It works on Real time and has low complexity

DISADVANATAGES:

-
- There might be issues faced with the connection to the satellite above to get real time images for processing and there may be delay caused.
- There is also the issue to connect to different satellites as the ship goes to various parts of the oceans.

8.APPLICATIONS:

- Used in Ship Navigation Systems to feature to avoid crashing into icebergs and navigating a safe course through the oceans.
- Minimizing human effort and cost efficient databases.
- Easy and simple interface to understand and help the user.

9.CONCLUSION:

I think this is one of the great examples where deep learning 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.

10. FUTURE SCOPE:

The extraction of the iceberg detection from the satellite imagery can be used in

- Digital cartography updating
- Multi-temporal change analysis
- Content-based image indexation

11. BIBLOGRAPHY:

Model Building
1. Dataset
2. Jupiter Notebook
Application Building
1. HTML file
2. CSS file 3. Flask
4. IBM Watson.

SOURCE CODE:

HTML Code:

```
<html>

<head>

    <meta charset="UTF-8">

    <meta name="viewport" content="width=device-width, initial-scale=1.0">

    <meta http-equiv="X-UA-Compatible" content="ie=edge">

    <title>Artificial Intelligence</title>

    <link href="https://cdn.bootcss.com/bootstrap/4.0.0/css/bootstrap.min.css" rel="stylesheet">

    <script src="https://cdn.bootcss.com/popper.js/1.12.9/umd/popper.min.js"></script>

    <script src="https://cdn.bootcss.com/jquery/3.3.1/jquery.min.js"></script>

    <script src="https://cdn.bootcss.com/bootstrap/4.0.0/js/bootstrap.min.js"></script>

    <link href="{{ url_for('static', filename='css/main.css') }}" rel="stylesheet">
```

```
   <link rel="stylesheet" href="{{url_for('static',filename='css/main6.css')}}">  <style>
.moveright {     text-
align:right;
}
.moveleft {     text-
align:left;
}
.movecenter{
   text-align: center;
}
.movejustify{
   text-align: justify; }
.images_span{
padding: 40px; }
.detect{     padding-left:
275px;     padding-right:
200px;     word-spacing:
20px;
} .button{ background-
color:blue;
color:white; } div.ex1{
          padding:25px;
width:30px;     background-
color:yellow;
```

```
} div.ex2{     background-

color:rgb(0,191,255);

color:rgb(162,0,175);

padding:35px; }

.heading_bar{
   padding-right: 200px;     padding-

top: 10px;     padding-bottom: 10px;

}

.navigation-buttons{     padding-

right : 50px;

}

.bg-dark {        background-color:

#42678c!important;

}

#result {

          color: orange;

}

 </style>

<script>

 function pageRedirect(){
window.location.href="https://www.britannica.com/science/iceberg/Icebergdetection-tracking-and-management"

 }  function pageRedirect2(){

window.location.href="https://en.wikipedia.org/wiki/List_of_ships_sunk_by_icebergs"

 }

 </script>

</head>
```

```
<body style="background-color: rgb(235, 217, 235);">

    <nav class="navbar navbar-dark bg-dark">

    <div class="container">

                <div class="heading_bar">

        <a href="#" style="color:white; font-size: x-large;"><strong>ICEBERG DETECTION</strong></a>

      </div>

      <div class="navigation-buttons">

        <button class="btn btn-primary btn-lg " type="button" onclick="pageRedirect()">Info</button>

                        <button class="btn btn-primary btn-lg " type="button"
onclick="pageRedirect2()">Case-Study</button>

                </div>

    </div>

            </nav>

<h2 style="color:red" ><strong>What's Importance of detecting an IceBerg ?</strong></h2> <p
class="movejustify">The Ocean is filled with obstacles and contains Icebergs which are threatening to
safety of the ship and its people. Especially in colder regions like the Arctic and Antarctic the
detection of icebergs are very essential for navigating a safe passage through the ocean to avoid
hitting an iceberg and is done through building image processing using satellite imagery and
should be able to detect the difference between a iceberg and a ship.</p>

<h2  class="movejustify" style="color:rgb(255, 0, 55)">What is the need to detect Iceberg?</h2>

<p class="moveleft">Methods of satellite monitoring of dangerous icebergs in the Arctic and Antarctic Oceans
are a threat to the safety of navigation for ships and economic condtions..</p>

<br>

<br>

<br>

<h2 class="movecenter" style="color:blue">Images of <strong> Ship</strong> hitting<strong>
Iceberg</strong></h2>

<span class="images_span">
```

<img src="https://encrypted-tbn0.gstatic.com/images?q=tbn%3AANd9GcTOLveW5N5bKvw_Pm3hsE0_fyieNhMfAPKWfQ&usqp=CAU",alt="img1" width="250" height="200">

<img src="https://encrypted-tbn0.gstatic.com/images?q=tbn%3AANd9GcQ8y445Rd08FK4-Mto3xvqkt3MKf4fxA9q1pA&usqp=CAU",alt="img2" width="250" height="200">

<img src="https://media1.s-nbcnews.com/j/msnbc/Components/Photo_StoryLevel/071123/071123_explorer_hmed_9p.fit-760w.jpg" alt="img3" width="250" height="200">

<img src="https://i.ytimg.com/vi/lHDia6SVWhc/hqdefault.jpg" alt="img4" width="250" height="200">

<img src="https://encrypted-tbn0.gstatic.com/images?q=tbn%3AANd9GcQmReYH5G3ea8abgPrvjRB16vtNbBgo_Aj5HQ&usqp=CAU",alt="img5" width="250" height="200">

<h2 class="movecenter">Detect the image</h2>

<img src="https://encryptedtbn0.gstatic.com/images?q=tbn%3AANd9GcQlsQMi3IG1VVuYIgG2l6RP78_h_cBMr8mA8A&usqp=CAU", alt="ice" width="300" height="250">

ICE OR SHIP

<img src="https://encrypted-tbn0.gstatic.com/images?q=tbn%3AANd9GcT2vejUS44qNmWxka7-VpReT47eRI48TTOJQ&usqp=CAU",alt="ship" width="300" height="250">

<h4 class="movecenter" style="color:black">Upload Image Here</h4>

```
    <form action="http:/localhost:5000/predict" id="upload-file" method="post" enctype="multipart/formdata">
        <label for="imageUpload" class="upload-label">
            Choose...
        </label>
        <input type="file" name="image" id="imageUpload" accept=".png, .jpg, .jpeg">
</form>
    <div class="image-section" style="display: block;">
        <div class="img-preview">
            <div id="imagePreview">
            </div>
        </div>
        <div>
            <button type="button" class="btn btn-primary btn-lg "id="btn-predict">Predict!</button>
        </div>
    </div>
    <div class="loader" style="display:block"></div>
    <h3 id="result">
        <span> </span>
    </h3>
</div>
</body>
<footer>
<script src="{{ url_for('static', filename='js/main.js') }}" type="text/javascript"></script>
</footer>
</html>
```

FLASK PROGRAM:

```
import numpy as np import os from keras.models
import load_model from keras.preprocessing
import image import tensorflow as tf global graph
graph = tf.compat.v1.get_default_graph() from
flask import Flask , request, render_template from
werkzeug.utils import secure_filename from
gevent.pywsgi import WSGIServer

app = Flask(__name__) model =
load_model("iceberg_model.h5")

@app.route('/') def
index():
    return render_template('index.html', methods= ['GET'])

@app.route('/predict',methods = ['GET','POST'])
def upload():     if request.method == "POST":

        f = request.files["image"]

        basepath = os.path.dirname(__file__)         print("current path",
basepath)         filepath =
os.path.join(basepath,"uploads",secure_filename(f.filename))
print("upload folder is ", filepath)
```

```
        f.save(filepath)


        img = image.load_img(filepath,target_size = (75,75))
x = image.img_to_array(img)         x =
np.expand_dims(x,axis =0)


        #with graph.as_default():
        preds = model.predict_classes(x)


        pred = preds[0][0]
if not pred:
            text ="Be Careful the is an Iceberg ahead."
        else:
            text = "Its Safe to go it's just a Ship"
print(text)         return text
if __name__ == '__main__':
    app.run()
```