AI-BASED LOCALIZATION AND CLASSIFICATION OF SKIN DISEASE WITH ERYTHEMA

PROJECT REPORT

PROJECT ID:PNT2022TMID25885

Team Size: 4

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PROJECT REPORT

1. INTRODUCTION

1.1 PROJECT OVERVIEW

Now a day's people are suffering from skin diseases, More than 125 million people suffering from Psoriasis also skin cancer rate is rapidly increasing over the last few decades especially Melanoma is most diversifying skin cancer. If skin diseases are not treated at an earlier stage, then it may lead to complications in the body including spreading of the infection from one individual to the other. The skin diseases can be prevented by investigating the infected region at an early stage. The characteristic of the skin images is diversified so that it is a challenging job to devise an efficient and robust algorithm for automatic detection of skin disease and its severity. Skin tone and skin colour play an important role in skin disease detection. Colour and coarseness of skin are visually different. Automatic processing of such images for skin analysis requires quantitative discriminator to differentiate the diseases.

1.2 PURPOSE

To overcome the above problem we are building a model which is used for the prevention and early detection of skin cancer, psoriasis. Basically, skin disease diagnosis depends on the different characteristics like colour, shape, texture etc. Here the person can capture the images of skin and then the image will be sent the trained model. The model analyses the image and detect whether the person is having skin disease or not.

2. LITERATURE SURVEY

2.1 EXISTING PROBLEM

The existing applications does not use large datasets and thus will not produce accurate results . And the algorithms used in these are generally designed to select a single likely diagnosis , thus providing suboptimal results for patients .Analyzing big data is a major challenge that these applications face.

2.2 REFERENCES

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image classification methods for diagnosis of skin cancer: Challenges and opportunities. *Computers in Biology and Medicine*, *127*, p.104065.

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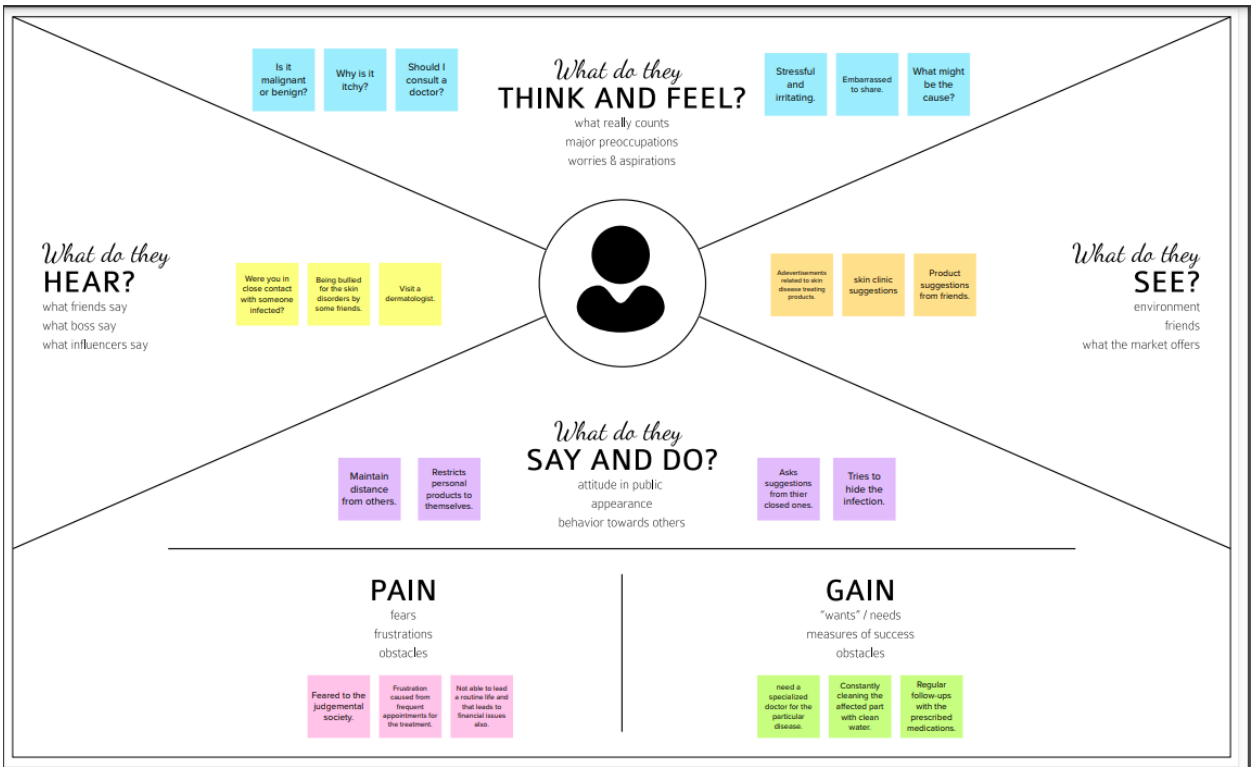
2.3 PROBLEM STATEMENT DEFINITION

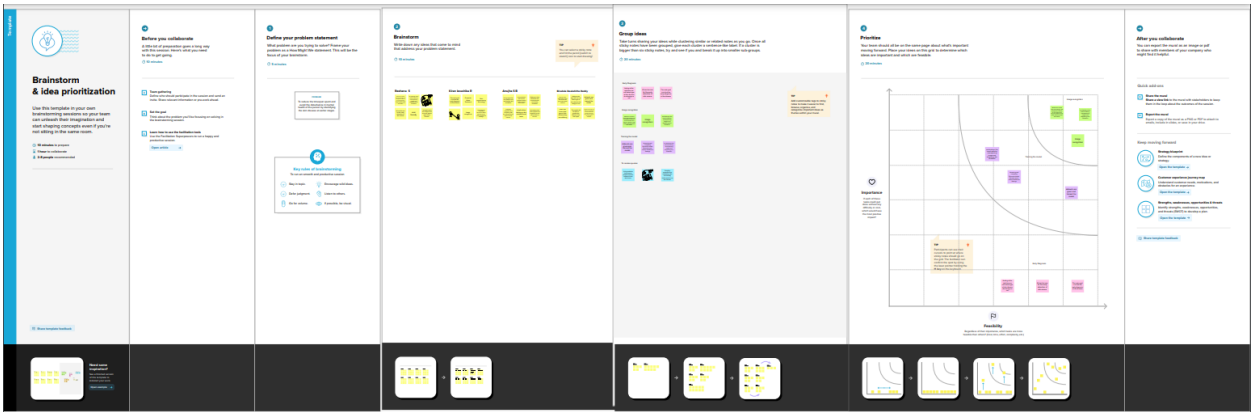
1. To virtually identify the skin disease of the patient at earlier stages.
2. To make the transportation effort of the patient easier.
3. To reduce the time span spent on finding a specialized doctor.
4. To avoid the disturbance in the mental health of the person.

3. IDEATION AND PROPOSED SYSTEM

3.1 EMPATHY MAP CANVAS



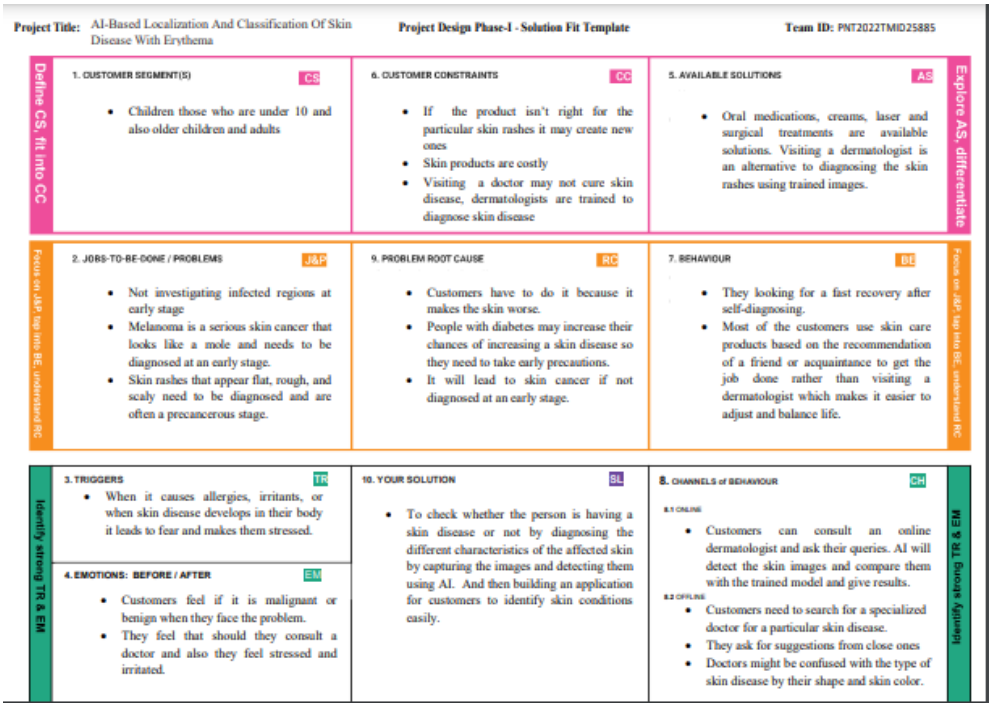
3.2 IDEATION AND BRAINSTORMING



3.3 PROPOSED SYSTEM

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	To reduce the timespan spent and avoid the disturbance in mental health of the person by identifying the skin disease at earlier stages.
2.	Idea / Solution description	To check whether the person is having a skin disease or not by diagnosing the different characteristics of affected skin by capturing the images and sent to the trained model.
3.	Novelty / Uniqueness	Its uniqueness is that it specifically exposes the disease at earlier stages, in the process of diagnosis.
4.	Social Impact / Customer Satisfaction	The advantage of knowing the type of disease the person is affected with, lets he or she to consult the respective specialized doctor for successful treatment and faster recovery.
5.	Business Model (Revenue Model)	It saves the patient's life by detecting the disease at earlier stage. Profits made from virtual consulting and by making people access the premium facilities.
6.	Scalability of the Solution	Scalability is high since this SaaS model enables people to access the services and features in detecting the skin disease more easily and also provides cloud storage.

3.4 PROBLEM FIT SOLUTION



4.REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENT

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Interface	Login Form
FR-4	Uploading the Image	Upload the captured images from Gallery Give access to capture images through Camera
FR-5	Display the Output	Display the Predicted Result
FR-6	User Logout	Logout indication through Gmail

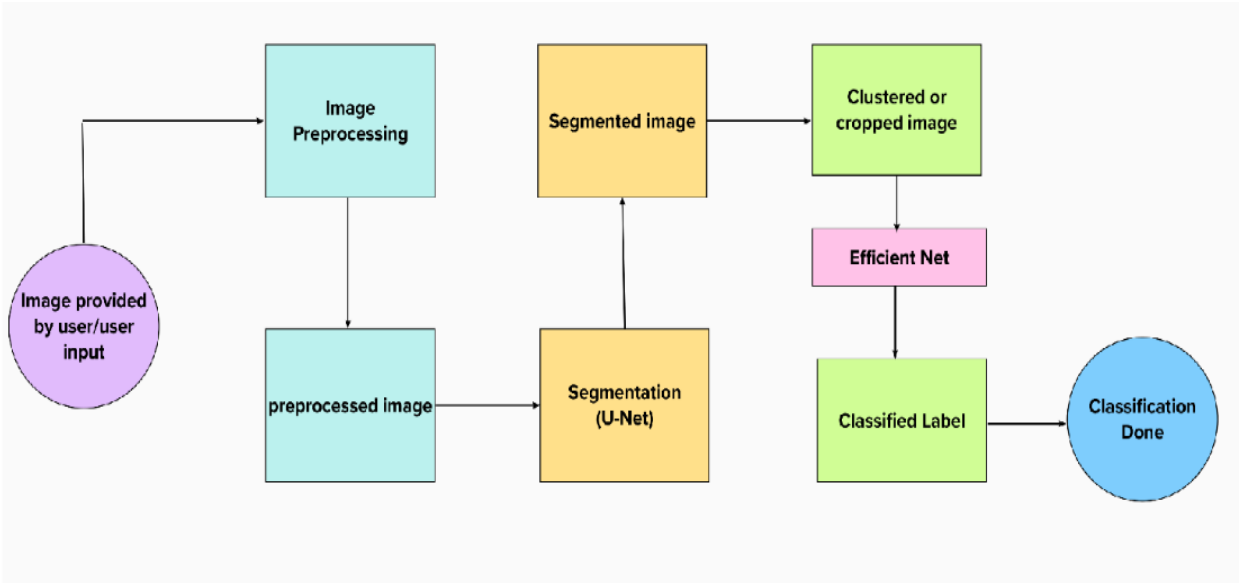
4.2 NON-FUNCTIONAL REQUIREMENTS

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	People who have less knowledge about technology should also able to use the website
NFR-2	**Security**	Data privacy and security practices may vary based on users and their age
NFR-3	**Reliability**	The website and its system should consistently perform the specified functions without failure
NFR-4	**Performance**	The loading time of the front page of the website must be no more than 2 seconds
NFR-5	**Availability**	How likely the system is accessible to a user at a given point in time
NFR-6	**Scalability**	The ability to appropriately handle different workloads

5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

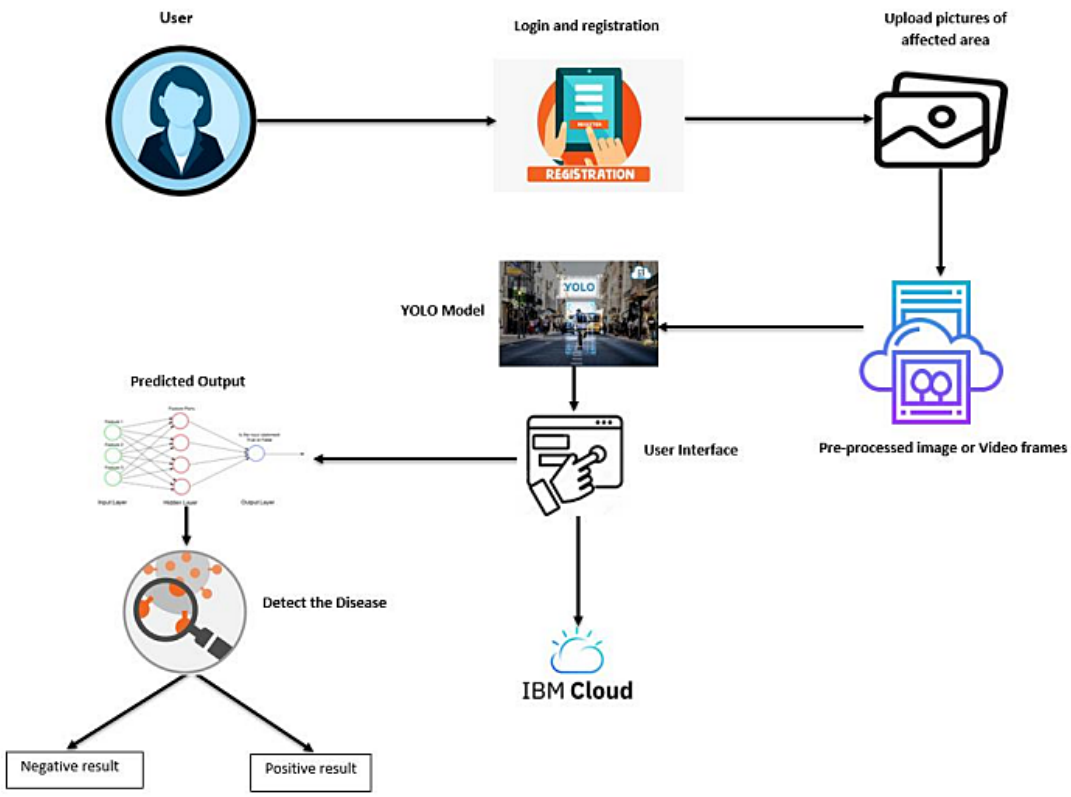


5.2 SOLUTION AND TECHNICAL ARCHITECTURE

Solution Architecture:

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the software's structure, characteristics, behavior, and other aspects to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.



Technical Architecture:

The Deliverable shall include the architectural diagram below and the information as per the table1 & table 2

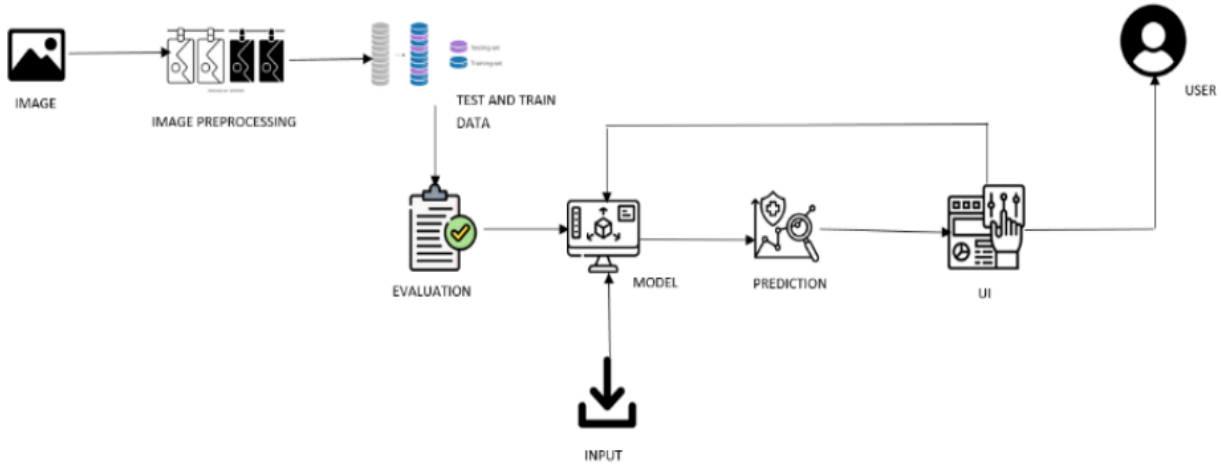


Table 1: Components and Technologies:

S.No	Component	Description	Technology
1.	User Interface	How the user interacts with the application	HTML, CSS, JavaScript
2.	Application Logic-1	HTML page for login, Registration, Prediction, and Logout	Python
3.	Application Logic-2	YOLOv3 detector is a real-time object detection algorithm that specifies the object in an image.	Python
4.	Application Logic-3	Computer vision can gain a high understanding of images.	OpenCV, machine learning software

5.	Database	Using chrome extensions such as batch downloader where you can search and download images from chrome	MySQL, NoSQL, etc.
6.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloudant etc.
7.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local Filesystem
8.	External API-1	Application registration using Email	HTML
9.	External API-2	Confirmation via Email	Email
10.	Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud server	IBM Platform

Table 2: Application Characteristics:

S.No	Characteristics	Description	Technologies
1.	Open-Source Frameworks	Annotate images using VOTT	Cloud DB
2.	Security Implementations	List all the security/access controls implemented, use of firewalls, etc.	Encryptions, IAM Controls

3.	Scalable Architecture	This method is ensured accurate information about the patient skin disease.	Artificial intelligence
4.	Availability	Prediction of the disease at early stages helps in the early cure of the disease	Image Processing
5.	Performance	The application can predict accurate results at perfect times.	IBM Cloud

5.3 USER STORIES

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail		Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password		High	Sprint-1
	Dashboard	USN-5	As a user, I can Access my Dashboard.		Medium	Sprint-3
Customer (Web user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-4
Customer Care Executive	Solution	USN-5	Responding to each email you receive can Responding to each email you receive can	Offer a solution for how your company can improve the customer's experience.	High	Sprint-3
Administrator	Manage	USN-5	Do-it-yourself service for delivering Everything.	set of predefined requirements that must be met to mark a user story complete.	High	Sprint-4

6. PROJECT PLANNING & SCHEDULING

6.1 SPRINT PLANNING AND ESTIMATION

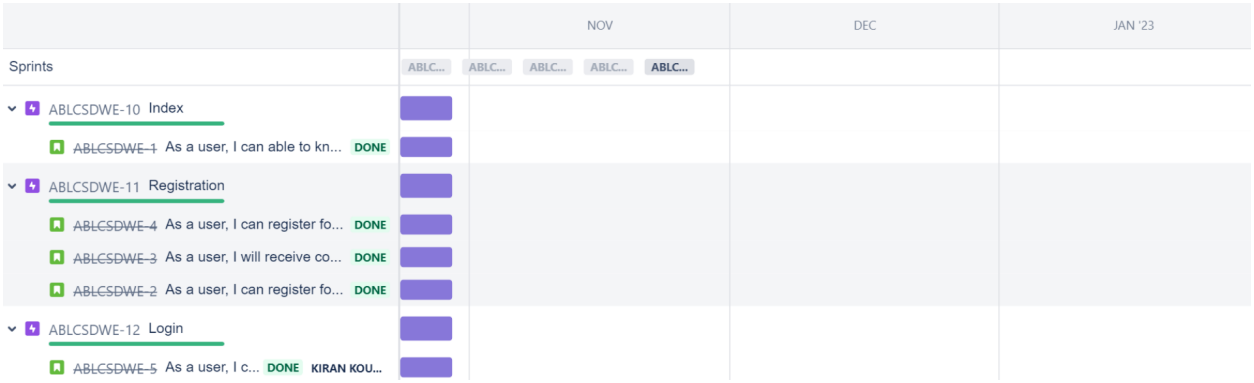
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Index	USN-1	As a user, I can able to know the basic information of skin disease	1	Low	
Sprint-1	Registration	USN-2	As a user, I can register for the application by entering my email, password, and confirmingmy password.	2	High	
Sprint-1		USN-3	As a user, I will receive confirmation email oncel have registered for the application	1	High	
Sprint-1		USN-4	As a user, I can register for the application through Gmail	2	Medium	
Sprint-1	Login	USN-5	As a user, I can log into the application by entering name, email and password	1	High	
Sprint-2	Prediction	USN-6	As a user, I should able to predict the type of skin Disease.	3	High	
Sprint-3	Demo	USN-7	As a user, I should able use the demo button, on how to use the application	3	Medium	
Sprint-4	Logout	USN-8	As a user, I can logout from the website once completed the process	2	Medium	
Sprint-4	Run	USN-9	As a user, I should test the app and run the Application.	3	High	

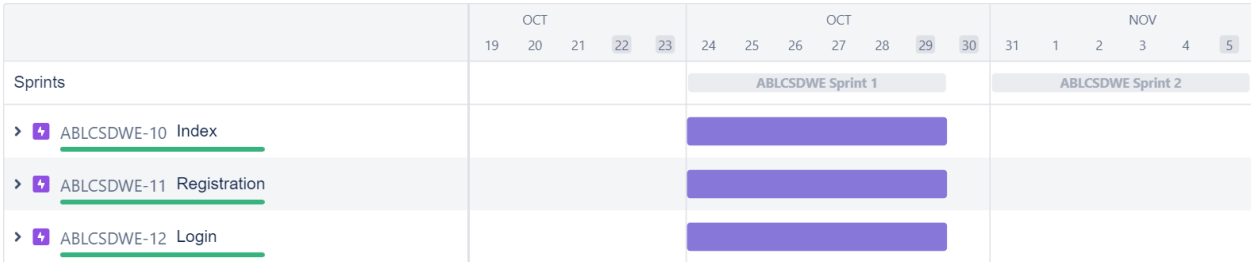
6.2 SPRINT DELIVERY SCHEDULE

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	3 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	10 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

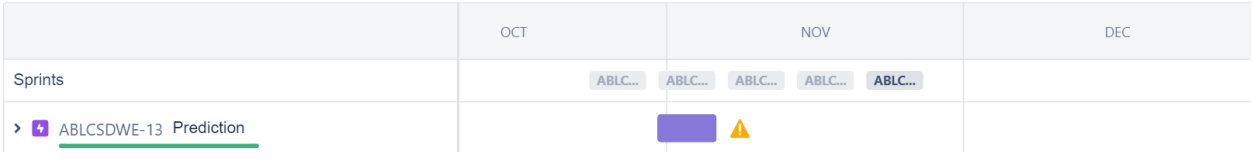
6.3 REPORTS FROM JIRA

SPRINT 1:

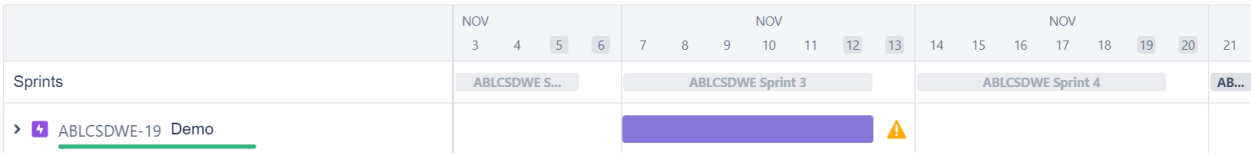




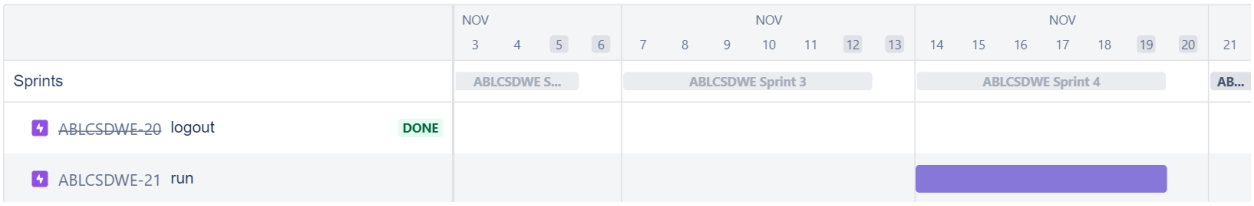
SPRINT 2:



SPRINT 3:



SPRINT 4:



7. CODING & SOLUTIONING

7.1 FEATURE 1

index.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">

    <!--Bootstrap -->
    <link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min.css" integrity="sha384-Gn5384xqQ1aoWXA+058RXPxPg6fy4IWvTNh0E263XmFcJlSAwiGgFAW/dAiS6JXm" crossorigin="anonymous">
    <script src="https://code.jquery.com/jquery-3.2.1.slim.min.js" integrity="sha384-KJ3o2DKtIkvYIK3UENzmM7KCkRr/rE9/Qpg6aAZGJwFDMVNA/GpGFF93hXpG5KkN" crossorigin="anonymous"></script>
    <script src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.12.9/umd/popper.min.js" integrity="sha384-ApNbgh9B+Y1QKtv3Rn7W3mgPxhU9K/ScQsAP7hUibX39j7fakFPskvXusvfa0b4Q" crossorigin="anonymous"></script>
    <script
```

```
    src="https://maxcdn.bootstrapcdn.com/bootstrap/4.0.0/js/bootstrap.min.j
    s" integrity="sha384-
    JZR6Spejh4U02d8jOt6vLEHfe/JQGiRRSQQxSfFWpi1MquVdAyjUar5+76PVCmYl"
    crossorigin="anonymous"></script>
13
14
15      <script src="https://kit.fontawesome.com/8b9cdc2059.js"
    crossorigin="anonymous"></script>
16      <link
    href="https://fonts.googleapis.com/css2?family=Akronim&family=Roboto&dis
    play=swap" rel="stylesheet">
17      <link rel="stylesheet" href="../static/style.css">
18      <!-- <script defer src="../static/js/main.js"></script> -->
19      <title>AI-based localization and classification of skin disease with
    erythema</title>
20  </head>
21  <body>
22      <header id="head" class="header">
23     <section  id="navbar">
24              <h1 class="nav-heading">AI-based localization and
    classification of skin disease with erythema</h1>
25          <div class="nav--items">
26              <ul>
27                      <li><a  href="index.html">Home</a></li>
28                      <li><a href="login.html">Login</a></li>
29                      <li><a href="register.html">Register</a></li>
30                  <!-- <li><a href="#about">About</a></li>
31                  <li><a href="#services">Services</a></li> -->
32                  <li><a href="prediction.html">Prediction</a></li>
33              </ul>
34          </div>
35     </section>
36     <section id="slider">
37      <div id="carouselExampleIndicators" class="carousel" data-
    ride="carousel">
38          <ol class="carousel-indicators ">
39              <li data-target="#carouselExampleIndicators" data-slide-
    to="0" class="active "></li>
40              <li data-target="#carouselExampleIndicators" data-slide-
    to="1"></li>
41              <li data-target="#carouselExampleIndicators" data-slide-
    to="2"></li>
42          </ol>
43          <div class="carousel-inner">
```

```
44
45              <div class="carousel-item active">
46                  <img class="d-block w-100"
   src="https://storage.googleapis.com/gweb-uniblog-publish-
   prod/images/derm_-_hero_image_2_1.max-1000x1000.jpg" alt="First slide"
   style="height:500px">
47              </div>
48
49          <a class="carousel-control-prev"
   href="#carouselExampleIndicators" role="button" data-slide="prev">
50              <span class="carousel-control-prev-icon" aria-
   hidden="true"></span>
51              <span class="sr-only">Previous</span>
52          </a>
53          <a class="carousel-control-next"
   href="#carouselExampleIndicators" role="button" data-slide="next">
54              <span class="carousel-control-next-icon" aria-
   hidden="true"></span>
55              <span class="sr-only">Next</span>
56          </a>
57      </div>
58
59     </section>
60 </header>
61 <section id="about">
62      <div class="top">
63          <h3 class="title text-muted">
64              ABOUT PROJECT
65          </h3>
66          <div class="line"></div>
67      </div>
68 <div class="body">
69 <div class="left">
70      <h2>Problem:</h2>
71      <p>
72          Nowadays people are suffering from skin diseases, More than 125
   million people suffering from Psoriasis also skin cancer rate is rapidly
   increasing over the last few decades especially Melanoma is most
   diversifying skin cancer. If skin diseases are not treated at an earlier
   stage, then it may lead to complications in the body including spreading
   of the infection from one individual to the other. The skin diseases can
   be prevented by investigating the infected region at an early stage. The
   characteristic of the skin images is diversified so that it is a
   challenging job to devise an efficient and robust algorithm for
```

```
    automatic detection of skin disease and its severity. Skin tone and skin
    colour play an important role in skin disease detection. Colour and
    coarseness of skin are visually different. Automatic processing of such
    images for skin analysis requires quantitative discriminator to
    differentiate the diseases.
73
74          </p>
75  </div>
76  <div class="right">
77      <h2>Solution:</h2>
78      <p>
79           To overcome this problem we are building a model which is used
    for the prevention and early detection of skin cancer, psoriasis.
    Basically, skin disease diagnosis depends on the different
    characteristics like colour, shape, texture etc. Here the person can
    capture the images of skin and then the image will be sent the trained
    model. The model analyses the image and detect whether the person is
    having skin disease or not
80      </p>
81  </div>
82  </div>
83  </section>
84  <section id="services">
85  <h3 class="title text-muted">WE CLASSIFY</h3>
86  <div class="line"></div>
87  <div class="testimonials">
88      <div class="card" style="width: 25rem;">
89          <img
    src="https://upload.wikimedia.org/wikipedia/commons/6/69/Erythema_multif
    orme_minor_of_the_hand.jpg" class="card-img-top" alt="Erythema
    multiforme (EM)" style="height: 300px">
90          <div class="card-body text-muted">
91            <h5 class="card-title text-muted">Erythema multiforme
    (EM)</h5>
92          </div>
93        </div>
94      <div class="card" style="width: 25rem;">
95          <img
    src="https://i.pinimg.com/736x/7e/ec/2e/7eec2ee1c2e592aa94dac11036fad68
    d--lyme-disease-nursing.jpg" class="card-img-top" alt="Erythema
    chronicum migrans" style="height:300px">
96          <div class="card-body text-muted">
97              <h5 class="card-title text-muted">Erythema chronicum
    migrans</h5>
```

```
98
99          </div>
100      </div>
101    <div class="card" style="width: 25rem;">
102        <img src="https://phil.cdc.gov//PHIL_Images/9875/9875_lores.jpg"
   class="card-img-top" alt="Erythema migrans" style="height:300px">
103        <div class="card-body">
104             <h5 class="card-title text-muted">Erythema migrans</h5>
105
106        </div>
107        <div class="card" style="width: 25rem;">
108            <img
   src="https://www.researchgate.net/publication/304555872/figure/fig1/AS:3
   79660283203584@1467529473118/Erythema-marginatum-on-the-arm-of-a-
   patient-with-hereditary-angioedema-Note-that-lesions.png" class="card-
   img-top" alt="Erythema marginatum" style="height:300px">
109            <div class="card-body">
110                        <h5 class="card-title text-muted">Erythema
   marginatum</h5>
111
112            </div>
113        <div class="card" style="width: 25rem;">
114                <img
   src="https://images.medicinenet.com/images/image_collection/skin/erythem
   a-infectiosum.jpg" class="card-img-top" alt="Erythema infectiosum"
   style="height:300px">
115                <div class="card-body">
116                            <h5 class="card-title text-muted">Erythema
   infectiosum</h5>
117
118            </div>
119        <div class="card" style="width: 25rem;">
120                <img
   src="https://media.healthdirect.org.au/images/inline/original/erythma_no
   dosum_a4gprc-ccee8a.jpg" class="card-img-top" alt="Erythema nodosum"
   style="height:300px">
121                <div class="card-body">
122                            <h5 class="card-title text-muted">Erythema
   nodosum</h5>
123
124            </div>
125
126      </div>
127
```

```
128</div>
129</section>
130
131
132<section id="footer">
133
134    <div class="social">
135      <a href="#" target="_blank"><i class="fab fa-2x fa-twitter-
   square"></i></a>
136       <a href="#" target="_blank">
137        <i class="fab fa-2x  fa-linkedin"></i></a>
138        <a href="#">
139            <i class="#"></i>
140        </a>
141    </div>
142</section>
143</body>
144</html>
```

- Index page of our UI consists of basic idea of our application.
- It consists of options to navigate from the home page to other pages.

register.html

```
1  <!DOCTYPE html>
2  <html >
3
4  <head>
5    <meta charset="UTF-8">
6    <meta name="viewport" content="width=device-width, initial-
   scale=1">
7    <title>AI-based localization and classification of skin disease
   with erythema</title>
8    <link href='https://fonts.googleapis.com/css?family=Pacifico'
   rel='stylesheet' type='text/css'>
9  <link href='https://fonts.googleapis.com/css?family=Arimo'
   rel='stylesheet' type='text/css'>
10 <link href='https://fonts.googleapis.com/css?family=Hind:300'
   rel='stylesheet' type='text/css'>
11 <link
   href='https://fonts.googleapis.com/css?family=Open+Sans+Condensed
   :300' rel='stylesheet' type='text/css'>
```

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

<link href='https://fonts.googleapis.com/css?family=Merriweather' rel='stylesheet'>
<link href='https://fonts.googleapis.com/css?family=Josefin Sans' rel='stylesheet'>
<link href='https://fonts.googleapis.com/css?family=Montserrat' rel='stylesheet'>

<style>
.header {
            top:0;
            margin:0px;
            left: 0px;
            right: 0px;
            position: fixed;
            background-color: #28272c;
            color: white;
            box-shadow: 0px 8px 4px grey;
            overflow: hidden;
            padding-left:20px;
            font-family: 'Josefin Sans';
            font-size: 2vw;
            width: 100%;
            height:8%;
            text-align: center;
        }
        .topnav {
  overflow: hidden;
  background-color: #333;
}

.topnav-right a {
  float: left;
  color: #f2f2f2;
  text-align: center;
  padding: 14px 16px;
  text-decoration: none;
```

```
  font-size: 18px;
}

.topnav-right a:hover {
  background-color: #ddd;
  color: black;
}

.topnav-right a.active {
  background-color: #565961;
  color: white;
}

.topnav-right {
  float: right;
  padding-right:100px;
}

.login{
margin-top:-70px;
}
body {

  background-color:#ffffff;
  background-repeat: no-repeat;
  background-size:cover;
  background-position: 0px 0px;
  }
.login{
 margin-top:100px;
}
form {border: 3px solid #f1f1f1; margin-left:400px;margin-
right:400px;}

input[type=text],
input[type=email],input[type=number],input[type=password] {
  width: 100%;
  padding: 12px 20px;
  display: inline-block;
  margin-bottom:18px;
```

```
  border: 1px solid #ccc;
  box-sizing: border-box;
}

button {
  background-color: #28272c;
  color: white;
  padding: 14px 20px;
  margin-bottom:8px;
  border: none;
  cursor: pointer;
  width: 100%;
}

button:hover {
   opacity: 0.8;
}

.cancelbtn {
   width: auto;
   padding: 10px 18px;
   background-color: #f44336;
}

.imgcontainer {
   text-align: center;
   margin: 24px 0 12px 0;
}

img.avatar {
   width: 30%;
   border-radius: 50%;
}

.container {
   padding: 16px;
}

span.psw {
   float: right;
```

```
  padding-top: 16px;

}

/* Change styles for span and cancel button on extra small screens */
@media screen and (max-width: 300px) {
  span.psw {
     display: block;
     float: none;
  }
  .cancelbtn {
     width: 100%;
  }
}

</style>
</head>

<body style="font-family:Montserrat;">

<div class="header">
  <div style="width:50%;float:left;font-size:1.5vw;text-align:left;color:white; padding-top:1%">AI-based localization and classification of skin disease with erythema</div>
  <div class="topnav-right" style="padding-top:0.5%;">

    <a  href="index.html">Home</a>
    <a href="login.html">Login</a>
    <a class="active"  href="register.html">Register</a>

  </div>
</div>
<div id="login" class="login">


    <form action="https://formspree.io/f/xdojbzrq" method="post">

```

```
161           <div class="container">
162                 <input type="text" placeholder="Enter Name"
   name="name" required><br>
163                 <input type="email" placeholder="Enter Email ID"
   name="_id" required><br>
164                 <input type="password" placeholder="Enter
   Password" name="psw" required>
165
166                 <button type="submit">Register</button><br>
167           </div>
168           <div class="container" style="background-
   color:#f1f1f1">
169     <div class="psw">Already have an account?   <a
   href="login.html">Login</a></div     >
170   </div>
171     </form>
172
173 </div>
174
175
176 </body>
177 </html>
```

- ➤ This page helps the user to register themselves into our application.
- ➤ Their basic information such as, mail id and name are saved into our database, so that the user can login in directly from the next time.

login.html

```
1  <!DOCTYPE html>
2  <html >
3
4  <head>
5    <meta charset="UTF-8">
6    <meta name="viewport" content="width=device-width, initial-
   scale=1">
7    <title> AI-based localization and classification of skin
   disease with erythema </title>
8    <link href='https://fonts.googleapis.com/css?family=Pacifico'
   rel='stylesheet' type='text/css'>
```

```
<link href='https://fonts.googleapis.com/css?family=Arimo' rel='stylesheet' type='text/css'>
<link href='https://fonts.googleapis.com/css?family=Hind:300' rel='stylesheet' type='text/css'>
<link href='https://fonts.googleapis.com/css?family=Open+Sans+Condensed:300' rel='stylesheet' type='text/css'>
<!link rel="stylesheet" href="{{ url_for('static', filename='css/style.css') }}">
<link href='https://fonts.googleapis.com/css?family=Merriweather' rel='stylesheet'>
<link href='https://fonts.googleapis.com/css?family=Josefin Sans' rel='stylesheet'>
<link href='https://fonts.googleapis.com/css?family=Montserrat' rel='stylesheet'>


<style>
.header {
            top:0;
            margin:0px;
            left: 0px;
            right: 0px;
            position: fixed;
            background-color: #28272c;
            color: white;
            box-shadow: 0px 8px 4px grey;
            overflow: hidden;
            padding-left:20px;
            font-family: 'Josefin Sans';
            font-size: 2vw;
            width: 100%;
            height:8%;
            text-align: center;
        }
.topnav {
  overflow: hidden;
  background-color: #333;
}
```

```
40
41 .topnav-right a {
42   float: left;
43   color: #f2f2f2;
44   text-align: center;
45   padding: 14px 16px;
46   text-decoration: none;
47   font-size: 18px;
48 }
49
50 .topnav-right a:hover {
51   background-color: #ddd;
52   color: black;
53 }
54
55 .topnav-right a.active {
56   background-color: #565961;
57   color: white;
58 }
59
60 .topnav-right {
61   float: right;
62   padding-right:100px;
63 }
64
65 .login{
66 margin-top:-70px;
67 }
68 body {
69
70   background-color:#ffffff;
71   background-repeat: no-repeat;
72   background-size:cover;
73   background-position: 0px 0px;
74   }
75 .login{
76  margin-top:100px;
77 }
78 form {border: 3px solid #f1f1f1; margin-left:400px;margin-
   right:400px;}
```

```
79
80 input[type=text],
   input[type=email],input[type=number],input[type=password] {
81   width: 100%;
82   padding: 12px 20px;
83   display: inline-block;
84   margin-bottom:18px;
85   border: 1px solid #ccc;
86   box-sizing: border-box;
87 }
88
89 button {
90   background-color: #28272c;
91   color: white;
92   padding: 14px 20px;
93   margin-bottom:8px;
94   border: none;
95   cursor: pointer;
96   width: 100%;
97   font-weight:bold;
98 }
99
100 button:hover {
101   opacity: 0.8;
102 }
103
104 .cancelbtn {
105   width: auto;
106   padding: 10px 18px;
107   background-color: #f44336;
108 }
109
110 .imgcontainer {
111   text-align: center;
112   margin: 24px 0 12px 0;
113 }
114
115 img.avatar {
116   width: 30%;
117   border-radius: 50%;
```

```
118 }
119
120 .container {
121   padding: 16px;
122 }
123
124 span.psw {
125   float: right;
126   padding-top: 16px;
127
128 }
129
130 /* Change styles for span and cancel button on extra small
    screens */
131 @media screen and (max-width: 300px) {
132   span.psw {
133      display: block;
134      float: none;
135   }
136   .cancelbtn {
137      width: 100%;
138   }
139 }
140
141 </style>
142 </head>
143
144 <body style="font-family:Montserrat;">
145
146 <div class="header">
147  <div style="width:50%;float:left;font-size:1.5vw;text-
    align:left;color:white; padding-top:1%">AI-based localization and
    classification of skin disease with erythema</div>
148   <div class="topnav-right" style="padding-top:0.5%;">
149
150     <a  href="index.html">Home</a>
151     <a class="active" href="login.html">Login</a>
152     <a  href="register.html">Register</a>
153
154   </div>
```

```
155 </div>
156 <div id="login" class="login">
157
158
159     <form action="prediction.html" method="post">
160
161
162           <div class="container">
163                 <input type="email" placeholder="Enter registered
    email ID" name="_id" required><br>
164
165                 <input type="password" placeholder="Enter
    Password" name="psw" required>
166
167                 <button type="submit">Login</button><br>
168
169           </div>
170     </form>
171
172 </div>
173
174
175 </body>
176 </html>
```

- ➤ After registering the information, the user can login our application directly.
- ➤ After logging in, the prediction page is visible.

prediction.html

```
1  <!DOCTYPE html>
2  <html lang="en">
3  <head>
4      <meta charset="UTF-8">
5      <meta http-equiv="X-UA-Compatible" content="IE=edge">
6      <meta name="viewport" content="width=device-width, initial-
    scale=1.0">
7      <!--Bootstrap -->
8      <link rel="stylesheet"
    href="https://maxcdn.bootstrapcdn.com/bootstrap/4.0.0/css/bootstra
```

```
    p.min.css" integrity="sha384-
    Gn5384xqQ1aoWXA+058RXPxPg6fy4IWvTNh0E263XmFcJlSAwiGgFAW/dAiS6JXm"
    crossorigin="anonymous">
9       <script src="https://code.jquery.com/jquery-3.2.1.slim.min.js"
    integrity="sha384-
    KJ3o2DKtIkvYIK3UENzmM7KCkRr/rE9/Qpg6aAZGJwFDMVNA/GpGFF93hXpG5KkN"
    crossorigin="anonymous"></script>
10      <script
    src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.12.9/umd/p
    opper.min.js" integrity="sha384-
    ApNbgh9B+Y1QKtv3Rn7W3mgPxhU9K/ScQsAP7hUibX39j7fakFPskvXusvfa0b4Q"
    crossorigin="anonymous"></script>
11      <script
    src="https://maxcdn.bootstrapcdn.com/bootstrap/4.0.0/js/bootstrap.
    min.js" integrity="sha384-
    JZR6Spejh4U02d8jOt6vLEHfe/JQGiRRSQQxSfFWpi1MquVdAyjUar5+76PVCmYl"
    crossorigin="anonymous"></script>
12
13
14      <script src="https://kit.fontawesome.com/8b9cdc2059.js"
    crossorigin="anonymous"></script>
15      <link
    href="https://fonts.googleapis.com/css2?family=Akronim&family=Robo
    to&display=swap" rel="stylesheet">
16      <link rel="stylesheet" href="../static/style.css">
17
18      <script defer src="../static/js/JScript.js"></script>
19      <title>Prediction</title>
20  </head>
21  <body>
22      <header id="head" class="header">
23          <section  id="navbar">
24                  <h1 class="nav-heading"></i>Skin Disease
    Detection</h1>
25              <div class="nav--items">
26                  <ul>
27                      <li><a  href="index.html">Home</a></li>
28                     <li><a
    href="file:///C:/Users/kiran/OneDrive/Desktop/SI-GuidedProject-
    89669-1658213465-
    main/project/templates/logout.html">Logout</a></li>
```

```
                <!-- <li><a href="#about">About</a></li>
                <li><a href="#services">Services</a></li> -->

                 </ul>
             </div>
         </section>
     </header>
     <!-- dataset/Training/metal/metal326.jpg -->
         </br>
     <section id="prediction">
     <h2 class="title text-muted">AI-based localization and classification of skin disease with erythema</h1>
     <div class="line" style="width: 1000px;"></div>
          </section>
          </br>
    <section id="about">

<div class="body">
<div class="left">
     <p>
        Nowadays people are suffering from skin diseases, More than 125 million people suffering from Psoriasis also skin cancer rate is rapidly increasing over the last few decades especially Melanoma is most diversifying skin cancer. If skin diseases are not treated at an earlier stage, then it may lead to complications in the body including spreading of the infection from one individual to the other. The skin diseases can be prevented by investigating the infected region at an early stage. The characteristic of the skin images is diversified so that it is a challenging job to devise an efficient and robust algorithm for automatic detection of skin disease and its severity. Skin tone and skin colour play an important role in skin disease detection. Colour and coarseness of skin are visually different. Automatic processing of such images for skin analysis requires quantitative discriminator to differentiate the diseases.

         </p>
</div>
<div class="left">

```

```
54     <div class="prediction-input">
55         <img class="d-block" src="../static/img/6623.jpg"
   alt="Second slide" style="width:80%!important; align:center;
   padding-left:100px">
56         </br>
57                 <form id="form" action="/result" method="post"
   enctype="multipart/form-data">
58
59                     <input type="submit" class="submitbtn"
   value="Click here for Prediction">
60                   </form>
61             </div>
62             <h5 style="text-color:Red">
63             <b style="text-color:Red" /b>
64           </h5>
65 </div>
66 </div>
67 </section>
68     <section id="footer">
69
70
71     </section>
72 </body>
73
74 </html>
```

- Image can be uploaded in the prediction page and the result is displayes here aswell.

final.css

```
1  .img-preview {
2      width: 256px;
3      height: 256px;
4      position: relative;
5      border: 5px solid #F8F8F8;
6      box-shadow: 0px 2px 4px 0px rgba(0, 0, 0, 0.1);
7      margin-top: 1em;
8      margin-bottom: 1em;
```

```
}

.img-preview>div {
    width: 100%;
    height: 100%;
    background-size: 256px 256px;
    background-repeat: no-repeat;
    background-position: center;
}

input[type="file"] {
    display: none;
}

.upload-label{
    display: inline-block;
    padding: 12px 30px;
    background: #28272c;
    color: #fff;
    font-size: 1em;
    transition: all .4s;
    cursor: pointer;
}

.upload-label:hover{
    background: #C2C5A8;
    color: #39D2B4;
}

.loader {
    border: 8px solid #f3f3f3; /* Light grey */
    border-top: 8px solid #28272c; /* Blue */
    border-radius: 50%;
    width: 50px;
    height: 50px;
    animation: spin 1s linear infinite;
}

@keyframes spin {
    0% { transform: rotate(0deg); }
```

```
    100% { transform: rotate(360deg); }
}
```

➤ Used to style the website.

style.css

```
:root{
    --main-bg-color: #fff;
    --text-color:#ced4da;
    --bs-font-sans-serif: Poppins, system-ui, -apple-system, "Segoe UI", Roboto, "Helvetica Neue", Arial, "Noto Sans", sans-serif, "Apple Color Emoji", "Segoe UI Emoji", "Segoe UI Symbol", "Noto Color Emoji";
    --navbar-bg:#333;
    --hover-color:#228B22;
    --yellow:#FFD700;
    --box-shadow:rgba(100, 100, 111, 0.2) 0px 7px 29px 0px

}

/* reset */
*{
    margin: 0;
    padding: 0;
    box-sizing: border-box;
}
body{
    background: var(--main-bg-color);
    font-family: var(--bs-font-sans-serif);
    color: #333;
    line-height: 1.6;
}
ul{
    list-style:none;
}
a{
    text-decoration: none;
    color: var(--text-color);
```

```
}

h1,h2{
    font-weight: 360;
    line-height: 1.2;
}
p{
 margin: 10px 0px;

}

.m2{
    margin-right: 10px;
}

/* utility */
.title{
    margin-top: 10px;
    text-align: center;
}
html {
    scroll-behavior: smooth;
  }

/* Header */
#head #navbar{
    height: 100px;
     width: auto;
    background-color: var(--navbar-bg);
    color: #fff;
    padding: 10px;
}
#navbar{
    display: flex;
    justify-content: space-between;
    align-items: center;
}
#navbar .nav--items ul{
```

```
    display: flex;
    align-items: center;
}

#navbar .nav--items ul li a{
margin: 10px;
text-decoration: none;
}
#navbar .nav--items ul li a:hover{
    color:var(--hover-color) ;
}

/* header carousel */
#head #slider .carousel-item img{
    display: block;
    width:100%;
    height: 50vh;
}

.font{
    font-size: 50px;
    font-weight: bold;
    color: #fff;
}

/* About */
#about .top{
    margin-top: 20px;
}

 .line{
    background-color: var(--yellow);
     width: 200px;
     height: 2px;
     margin: auto;
     margin-top: 10px;
 }
#about .body{
     margin-top: 20px;
```

```
    display: grid;
    grid-template-columns: 1fr 1fr;
    text-align: center;
}

#about .body .right,#about .body .left
{
    box-shadow: rgba(0, 0, 0, 0.15) 0px 3px 3px 0px;
margin: 0.5rem;
}

#about .body .right p{
    justify-self: center;
    margin-top: 50px;
}
/* Services */
#services .testimonials{
    display: grid;
    grid-template-columns: 1fr ;
    grid-column-gap: 10px;
    grid-row-gap: 20px;
    margin: 40px;
   justify-items: center;

}
#services .testimonials .card{
 box-shadow: rgba(0, 0, 0, 0.35) 0px 5px 15px;
 text-align: center;
}

#services .testimonials .card h5{
text-transform: uppercase;
}

/* Contcat form */
#contact .contact-container{
    display: grid;

    grid-template-columns: repeat(3,1fr);
```

```
146     justify-items: center;
147     margin: 3rem;
148 }
149 #contact .contact-container .conatct-left .items h3{
150     display: inline;
151     margin-left: 10px;
152 }
153
154 #contact .contact-container .conatct-left .items{
155     margin: 10px;
156     margin-bottom: 30px;
157
158 }
159
160 #contact .contact-container .contact-right form input,
161 #contact .contact-container .contact-right form button
162  {
163     display: block;
164     margin: 20px
165     }
166
167 /* footer */
168 #footer {
169   width: auto;
170   height: 80px;
171    background-color: var(--navbar-bg);
172    color: #fff;
173    display: flex;
174    align-items: center;
175    justify-content: space-around;
176 }
177 #footer .social a{
178   margin-left: 20px;
179   text-decoration: none;
180 }
181 #footer .social a:hover{
182    color: var(--hover-color);
183 }
184 /* prediction.html */
185
186 #prediction .prediction-input{
187   display: flex;
```

```
    align-items: center;
    justify-content: center;
    margin-top: 1.5rem;
}
#prediction .prediction-input form{
    margin-left: 1.2rem;
}
#prediction .circle {
    width: 150px;
    height: 150px;
    border-radius: 50%;
    margin-bottom: 5px;
    box-shadow:var(--box-shadow);
    transition:all ease-in 1s;
}

.output{
    width: 200px;
    margin: 10rem 1.5rem;
    padding: 6px;
    text-align: center;
    box-shadow: rgba(0, 0, 0, 0.35) 0px 5px 15px;
}
 .output-container{
     display: grid;
    row-gap: 10px;
    grid-template-areas: 'img1 img2 img3 img4 img5 img6';
}

/* Hidden class */
.hidden{
    visibility: hidden;
}
.hide{
    visibility: hidden;
}
```

JScript.js

```
'use strict'
const demo = document.querySelector('#demo');
const imageUpload = document.getElementById('imageupload');
```

```
const dataAttributeEL = document.querySelectorAll(`div[data-type]`);
const displayAll = function () {
    dataAttributeEL.forEach(el => {
        el.classList.remove('hidden')
    })
}


imageUpload.addEventListener('change', (event) => {
    const fileList = event.target.files[0];

    //console.log(URL.createObjectURL(fileList));
    if (fileList) {
        demo.src =URL.createObjectURL(fileList);
    }
    displayAll();

});

const prediction = document.querySelector('#result')
dataAttributeEL.forEach(el => {
    if (el.dataset.type !== prediction.innerHTML.trim()) {
        el.classList.add('hidden')
    };
})
```

main.js

```
$(document).ready(function () {
    // Init
    $('.image-section').hide();
    $('.loader').hide();
    $('#result').hide();

    // Upload Preview
    function readURL(input) {
        if (input.files && input.files[0]) {
            var reader = new FileReader();
            reader.onload = function (e) {
                $('#imagePreview').css('background-image', 'url(' + e.target.result + ')');
                $('#imagePreview').hide();
                $('#imagePreview').fadeIn(650);
            }
            reader.readAsDataURL(input.files[0]);
```

```
        }
    }
    $("#imageUpload").change(function () {
        $('.image-section').show();
        $('#btn-predict').show();
        $('#result').text('');
        $('#result').hide();
        readURL(this);
    });

    // Predict
    $('#btn-predict').click(function () {
        var form_data = new FormData($('#upload-file')[0]);

        // Show loading animation
        $(this).hide();
        $('.loader').show();

        // Make prediction by calling api /predict
        $.ajax({
            type: 'POST',
            url: '/predict',
            data: form_data,
            contentType: false,
            cache: false,
            processData: false,
            async: true,
            success: function (data) {
                // Get and display the result
                $('.loader').hide();
                $('#result').fadeIn(600);
                $('#result').text('Prediction: '+data);
                console.log('Success!');
            },
        });
    });

});
```

7.2 FEATURE 2

app.py

```
import re
import numpy as np
import os
```

```
from flask import Flask, app,request,render_template
import sys
from flask import Flask, request, render_template, redirect, url_for
import argparse
from tensorflow import keras
from PIL import Image
from timeit import default_timer as timer
import test
import pandas as pd
import numpy as np
import random

def get_parent_dir(n=1):
    """ returns the n-th parent dicrectory of the current
    working directory """
    current_path = os.path.dirname(os.path.abspath(__file__))
    for k in range(n):
        current_path = os.path.dirname(current_path)
    return current_path


src_path =r'C:\Users\manik\Desktop\yolo_structure\yolo_structure-master\2_Training\src'
print(src_path)
utils_path = r'C:\Users\manik\Desktop\yolo_structure\yolo_structure-master\Utils'
print(utils_path)

sys.path.append(src_path)
sys.path.append(utils_path)

import argparse
from keras_yolo3.yolo import YOLO, detect_video
from PIL import Image
from timeit import default_timer as timer
from utils import load_extractor_model, load_features, parse_input, detect_object
import test
import utils
import pandas as pd
import numpy as np
from Get_File_Paths import GetFileList
import random

os.environ["TF_CPP_MIN_LOG_LEVEL"] = "3"

# Set up folder names for default values
```

```
data_folder = os.path.join(get_parent_dir(n=1), "Skin Disease-Flask", "Data")

image_folder = os.path.join(data_folder, "Source_Images")

image_test_folder = os.path.join(image_folder, "Test_Images")

detection_results_folder = os.path.join(image_folder, "Test_Image_Detection_Results")
detection_results_file = os.path.join(detection_results_folder, "Detection_Results.csv")

model_folder = os.path.join(data_folder, "Model_Weights")

model_weights = os.path.join(model_folder, "trained_weights_final.h5")
model_classes = os.path.join(model_folder, "data_classes.txt")

anchors_path = os.path.join(src_path, "keras_yolo3", "model_data", "yolo_anchors.txt")

FLAGS = None


from cloudant.client import Cloudant

# Authenticate using an IAM API key
client = Cloudant('2eb40045-a8d6-450d-9d24-52cc7cbb2810-
bluemix','Ud0wunTPOl_8h5ZtEqi1IXk1gIKeYLmpUsCn0EeO8T4z', connect=True)


# Create a database using an initialized client
my_database = client.create_database('my_database')


app=Flask(__name__)

#default home page or route
@app.route('/')
def index():
    return render_template('index.html')



@app.route('/index.html')
def home():
    return render_template("index.html")


```

```
#registration page
@app.route('/register')
def register():
    return render_template('register.html')

@app.route('/afterreg', methods=['POST'])
def afterreg():
    x = [x for x in request.form.values()]
    print(x)
    data = {
    '_id': x[1], # Setting _id is optional
    'name': x[0],
    'psw':x[2]
    }
    print(data)

    query = {'_id': {'$eq': data['_id']}}

    docs = my_database.get_query_result(query)
    print(docs)

    print(len(docs.all()))

    if(len(docs.all())==0):
        url = my_database.create_document(data)
        #response = requests.get(url)
        return render_template('register.html', pred="Registration Successful, please login using your details")
    else:
        return render_template('register.html', pred="You are already a member, please login using your details")

#login page
@app.route('/login')
def login():
    return render_template('login.html')

@app.route('/afterlogin',methods=['POST'])
def afterlogin():
    user = request.form['_id']
    passw = request.form['psw']
    print(user,passw)

    query = {'_id': {'$eq': user}}
```

```
133
134     docs = my_database.get_query_result(query)
135     print(docs)
136
137     print(len(docs.all()))
138
139
140     if(len(docs.all())==0):
141         return render_template('login.html', pred="The username is not found.")
142     else:
143         if((user==docs[0][0]['_id'] and passw==docs[0][0]['psw'])):
144             return redirect(url_for('prediction'))
145         else:
146             print('Invalid User')
147
148
149 @app.route('/logout')
150 def logout():
151     return render_template('logout.html')
152
153 @app.route('/prediction')
154 def prediction():
155     return render_template('prediction.html')
156
157
158 @app.route('/result',methods=["GET","POST"])
159 def res():
160     # Delete all default flags
161     parser = argparse.ArgumentParser(argument_default=argparse.SUPPRESS)
162     """
163     Command line options
164     """
165
166     parser.add_argument(
167         "--input_path",
168         type=str,
169         default=image_test_folder,
170         help="Path to image/video directory. All subdirectories will be included. Default is "
171         + image_test_folder,
172     )
173
174     parser.add_argument(
175         "--output",
176         type=str,
```

```
177     default=detection_results_folder,
178     help="Output path for detection results. Default is "
179     + detection_results_folder,
180 )
181
182 parser.add_argument(
183     "--no_save_img",
184     default=False,
185     action="store_true",
186     help="Only save bounding box coordinates but do not save output images with annotated
    boxes. Default is False.",
187 )
188
189 parser.add_argument(
190     "--file_types",
191     "--names-list",
192     nargs="*",
193     default=[],
194     help="Specify list of file types to include. Default is --file_types .jpg .jpeg .png .mp4",
195 )
196
197 parser.add_argument(
198     "--yolo_model",
199     type=str,
200     dest="model_path",
201     default=model_weights,
202     help="Path to pre-trained weight files. Default is " + model_weights,
203 )
204
205 parser.add_argument(
206     "--anchors",
207     type=str,
208     dest="anchors_path",
209     default=anchors_path,
210     help="Path to YOLO anchors. Default is " + anchors_path,
211 )
212
213 parser.add_argument(
214     "--classes",
215     type=str,
216     dest="classes_path",
217     default=model_classes,
218     help="Path to YOLO class specifications. Default is " + model_classes,
219 )
```

```
220
221 parser.add_argument(
222     "--gpu_num", type=int, default=1, help="Number of GPU to use. Default is 1"
223 )
224
225 parser.add_argument(
226     "--confidence",
227     type=float,
228     dest="score",
229     default=0.25,
230     help="Threshold for YOLO object confidence score to show predictions. Default is 0.25.",
231 )
232
233 parser.add_argument(
234     "--box_file",
235     type=str,
236     dest="box",
237     default=detection_results_file,
238     help="File to save bounding box results to. Default is "
239     + detection_results_file,
240 )
241
242 parser.add_argument(
243     "--postfix",
244     type=str,
245     dest="postfix",
246     default="_disease",
247     help='Specify the postfix for images with bounding boxes. Default is "_disease"',
248 )
249
250 FLAGS = parser.parse_args()
251
252 save_img = not FLAGS.no_save_img
253
254 file_types = FLAGS.file_types
255 #print(input_path)
256
257 if file_types:
258     input_paths = GetFileList(FLAGS.input_path, endings=file_types)
259     print(input_paths)
260 else:
261     input_paths = GetFileList(FLAGS.input_path)
262     print(input_paths)
263
```

```
264  # Split images and videos
265  img_endings = (".jpg", ".jpeg", ".png")
266  vid_endings = (".mp4", ".mpeg", ".mpg", ".avi")
267
268  input_image_paths = []
269  input_video_paths = []
270  for item in input_paths:
271      if item.endswith(img_endings):
272          input_image_paths.append(item)
273      elif item.endswith(vid_endings):
274          input_video_paths.append(item)
275
276  output_path = FLAGS.output
277  if not os.path.exists(output_path):
278      os.makedirs(output_path)
279
280  # define YOLO detector
281  yolo = YOLO(
282      **{
283          "model_path": FLAGS.model_path,
284          "anchors_path": FLAGS.anchors_path,
285          "classes_path": FLAGS.classes_path,
286          "score": FLAGS.score,
287          "gpu_num": FLAGS.gpu_num,
288          "model_image_size": (416, 416),
289      }
290  )
291
292  # Make a dataframe for the prediction outputs
293  out_df = pd.DataFrame(
294      columns=[
295          "image",
296          "image_path",
297          "xmin",
298          "ymin",
299          "xmax",
300          "ymax",
301          "label",
302          "confidence",
303          "x_size",
304          "y_size",
305      ]
306  )
307
```

```
# labels to draw on images
class_file = open(FLAGS.classes_path, "r")
input_labels = [line.rstrip("\n") for line in class_file.readlines()]
print("Found {} input labels: {} ...".format(len(input_labels), input_labels))

if input_image_paths:
    print(
        "Found {} input images: {} ...".format(
            len(input_image_paths),
            [os.path.basename(f) for f in input_image_paths[:5]],
        )
    )
    start = timer()
    text_out = ""

    # This is for images
    for i, img_path in enumerate(input_image_paths):
        print(img_path)
        prediction, image,lat,lon= detect_object(
            yolo,
            img_path,
            save_img=save_img,
            save_img_path=FLAGS.output,
            postfix=FLAGS.postfix,
        )
        print(lat,lon)
        y_size, x_size, _ = np.array(image).shape
        for single_prediction in prediction:
            out_df = out_df.append(
                pd.DataFrame(
                    [
                        [
                            os.path.basename(img_path.rstrip("\n")),
                            img_path.rstrip("\n"),
                        ]
                        + single_prediction
                        + [x_size, y_size]
                    ],
                    columns=[
                        "image",
                        "image_path",
                        "xmin",
                        "ymin",
                        "xmax",
```

```
                    "ymax",
                    "label",
                    "confidence",
                    "x_size",
                    "y_size",
                ],
            )
        )
    end = timer()
    print(
        "Processed {} images in {:.1f}sec - {:.1f}FPS".format(
            len(input_image_paths),
            end - start,
            len(input_image_paths) / (end - start),
        )
    )
    out_df.to_csv(FLAGS.box, index=False)

# This is for videos
if input_video_paths:
    print(
        "Found {} input videos: {} ...".format(
            len(input_video_paths),
            [os.path.basename(f) for f in input_video_paths[:5]],
        )
    )
    start = timer()
    for i, vid_path in enumerate(input_video_paths):
        output_path = os.path.join(
            FLAGS.output,
            os.path.basename(vid_path).replace(".", FLAGS.postfix + "."),
        )
        detect_video(yolo, vid_path, output_path=output_path)

    end = timer()
    print(
        "Processed {} videos in {:.1f}sec".format(
            len(input_video_paths), end - start
        )
    )
# Close the current yolo session
yolo.close_session()
return render_template('prediction.html')

```

```
396
397""" Running our application """
398if __name__ == "__main__":
399    app.run(debug=True)
```

➤ All the html files are attached in this file and the yolo model is deployed and attached here aswell.

Convert_Format.py

```
1   import os
2   import re
3   from os import makedirs, path
4
5   import numpy as np
6   import pandas as pd
7   from PIL import Image
8
9   from Get_File_Paths import ChangeToOtherMachine, GetFileList
10
11
12  def convert_vott_csv_to_yolo(
13      vott_df,
14      labeldict=dict(zip(["Cat_Face"], [0,])),
15      path="",
16      target_name="data_train.txt",
17      abs_path=False,
18  ):
19
20      # Encode labels according to labeldict if code's don't exist
21      if not "code" in vott_df.columns:
22          vott_df["code"] = vott_df["label"].apply(lambda x: labeldict[x])
23      # Round float to ints
24      for col in vott_df[["xmin", "ymin", "xmax", "ymax"]]:
25          vott_df[col] = (vott_df[col]).apply(lambda x: round(x))
26
27      # Create Yolo Text file
28      last_image = ""
29      txt_file = ""
30
31      for index, row in vott_df.iterrows():
32          if not last_image == row["image"]:
33              if abs_path:
```

```
            txt_file += "\n" + row["image_path"] + " "
        else:
            txt_file += "\n" + os.path.join(path, row["image"]) + " "
        txt_file += ",".join(
            [
                str(x)
                for x in (row[["xmin", "ymin", "xmax", "ymax", "code"]].tolist())
            ]
        )
    else:
        txt_file += " "
        txt_file += ",".join(
            [
                str(x)
                for x in (row[["xmin", "ymin", "xmax", "ymax", "code"]].tolist())
            ]
        )
    last_image = row["image"]
file = open(target_name, "w")
file.write(txt_file[1:])
file.close()
return True


def csv_from_xml(directory, path_name=""):
    # First get all images and xml files from path and its subfolders
    image_paths = GetFileList(directory, ".jpg")
    xml_paths = GetFileList(directory, ".xml")
    result_df = pd.DataFrame()
    if not len(image_paths) == len(xml_paths):
        print("number of annotations doesnt match number of images")
        return False
    for image in image_paths:
        target_filename = os.path.join(path_name, image) if path_name else image
        source_filename = os.path.join(directory, image)
        y_size, x_size, _ = np.array(Image.open(source_filename)).shape
            source_xml = image.replace(".jpg", ".xml")
            txt = open(source_xml, "r").read()
            y_vals = re.findall(r"(?:x>\n)(.*)(?:\n</)", txt)
            ymin_vals = y_vals[::2]
            ymax_vals = y_vals[1::2]
            x_vals = re.findall(r"(?:y>\n)(.*)(?:\n</)", txt)
            xmin_vals = x_vals[::2]
```

```
77          xmax_vals = x_vals[1::2]
78          label_vals = re.findall(r"(?:label>\n)(.*)(?:\n</)", txt)
79          label_name_vals =
   re.findall(r"(?:labelname>\n)(.*)(?:\n</)", txt)
80          df = pd.DataFrame()
81          df["xmin"] = xmin_vals
82          df["xmin"] = df["xmin"].astype(float) * x_size
83          df["ymin"] = ymin_vals
84          df["ymin"] = df["ymin"].astype(float) * y_size
85          df["xmax"] = xmax_vals
86          df["xmax"] = df["xmax"].astype(float) * x_size
87          df["ymax"] = ymax_vals
88          df["ymax"] = df["ymax"].astype(float) * y_size
89          df["label"] = label_name_vals
90          df["code"] = label_vals
91          df["image_path"] = target_filename
92          df["image"] = os.path.basename(target_filename)
93          result_df = result_df.append(df)
94      #      Bring image column first
95      cols = list(df.columns)
96      cols = [cols[-1]] + cols[:-1]
97      result_df = result_df[cols]
98      return result_df
99
100
101 def crop_and_save(
102      image_df,
103      target_path,
104      target_file,
105      one=True,
106      label_dict={0: "house"},
107      postfix="cropped",
108 ):
109      """Takes a vott_csv file with image names, labels and
   crop_boxes
110      and crops the images accordingly
111
112      Input csv file format:
113
114      image   xmin ymin xmax ymax label
```

```
    im.jpg  0    10   100  500  house

    Parameters
    ----------
    df : pd.Dataframe
        The input dataframe with file_names, bounding box info
        and label
    source_path : str
        Path of source images
    target_path : str, optional
        Path to save cropped images
    one : boolean, optional
        if True, only the most central house will be returned
    Returns
    -------
    True if completed succesfully
    """
    if not path.isdir(target_path):
        makedirs(target_path)

    previous_name = ""
    counter = 0
    image_df.dropna(inplace=True)
    image_df["image_path"] =
  ChangeToOtherMachine(image_df["image_path"].values)

    def find_rel_position(row):
        current_name = row["image_path"]
        x_size, _ = Image.open(current_name).size
        x_centrality = abs((row["xmin"] + row["xmax"]) / 2 /
  x_size - 0.5)
        return x_centrality

    if one:
        centrality = []
        for index, row in image_df.iterrows():
            centrality.append(find_rel_position(row))
        image_df["x_centrality"] = pd.Series(centrality)
        image_df.sort_values(["image", "x_centrality"],
  inplace=True)
```

```
        image_df.drop_duplicates(subset="image", keep="first", inplace=True)
    new_paths = []
    for index, row in image_df.iterrows():
        current_name = row["image_path"]
        if current_name == previous_name:
            counter += 1
        else:
            counter = 0
        imageObject = Image.open(current_name)
        cropped = imageObject.crop((row["xmin"], row["ymin"], row["xmax"], row["ymax"]))
        label = row["label"]
        if type(label) == int:
            label = label_dict[label]
        image_name_cropped = (
            "_".join([row["image"][:-4], postfix, label, str(counter)]) + ".jpg"
        )
        new_path = os.path.join(target_path, image_name_cropped)
        cropped.save(new_path)
        new_paths.append(new_path.replace("\\", "/"))
        previous_name = current_name
    pd.DataFrame(new_paths, columns=["image_path"]).to_csv(target_file)
    return True


if __name__ == "__main__":
    # Prepare the houses dataset for YOLO
    labeldict = dict(zip(["house"], [0,]))

    multi_df = r"C:\Users\Admin\Desktop\yolo_structure\Data\Source_Images\Training_Images\vott-csv-export\Annotations-export.csv"

    convert_vott_csv_to_yolo(
        multi_df,
        labeldict,
        path=r"C:\Users\Admin\Desktop\data\skin",
```

```
        target_name= "data_train.txt"
    )

    # Prepare the windows dataset for YOLO
    path = r"C:\Users\Admin\Desktop\yolo_structure\Data\Source_Images\base"
    csv_from_xml(path, r"C:\Users\Admin\Desktop\data\windows").to_csv(r"C:\Users\Admin\Desktop\yolo_structure\Data\Source_Images\base/annotations.csv")

    label_names = [
        "Erythema multiforme (EM)",
        "Erythema chronicum migrans",
        "Erythema migrans",
        "Erythema marginatum",
        "Erythema infectiosum",
        "Erythema nodosum"
    ]
    labeldict = dict(zip(label_names, list(range(6))))
    convert_vott_csv_to_yolo(
        csv_from_xml(path, r"C:\Users\Admin\Desktop\data\windows"), labeldict
    )
```

Convert_to_YOLO_format.py

```
from PIL import Image
from os import path, makedirs
import os
import re
import pandas as pd
import sys
import argparse


from Convert_Format import convert_vott_csv_to_yolo


def get_parent_dir(n=1):
```

```
    """ returns the n-th parent dicrectory of the current
    working directory """
    current_path = os.path.dirname(os.path.abspath(__file__))
    for k in range(n):
        current_path = os.path.dirname(current_path)
    return current_path


sys.path.append(os.path.join(get_parent_dir(1), "Utils"))


Data_Folder = os.path.join(get_parent_dir(1), "Data")
VoTT_Folder = os.path.join(
    Data_Folder, "Source_Images", "Training_Images", "vott-csv-
export"
)
VoTT_csv = os.path.join(VoTT_Folder, "Annotations-export.csv")
YOLO_filename = os.path.join(VoTT_Folder, "data_train.txt")

model_folder = os.path.join(Data_Folder, "Model_Weights")
classes_filename = os.path.join(model_folder, "data_classes.txt")

if __name__ == "__main__":
    # surpress any inhereted default values
    parser =
argparse.ArgumentParser(argument_default=argparse.SUPPRESS)
    """
    Command line options
    """
    parser.add_argument(
        "--VoTT_Folder",
        type=str,
        default=VoTT_Folder,
        help="Absolute path to the exported files from the image
tagging step with VoTT. Default is "
        + VoTT_Folder,
    )

    parser.add_argument(
        "--VoTT_csv",
```

```
        type=str,
        default=VoTT_csv,
        help="Absolute path to the *.csv file exported from VoTT. Default is "
        + VoTT_csv,
    )
    parser.add_argument(
        "--YOLO_filename",
        type=str,
        default=YOLO_filename,
        help="Absolute path to the file where the annotations in YOLO format should be saved. Default is "
        + YOLO_filename,
    )

    FLAGS = parser.parse_args()

    # Prepare the dataset for YOLO
    multi_df = pd.read_csv(FLAGS.VoTT_csv)
    labels = multi_df["label"].unique()
    labeldict = dict(zip(labels, range(len(labels))))
    multi_df.drop_duplicates(subset=None, keep="first", inplace=True)
    train_path = FLAGS.VoTT_Folder
    convert_vott_csv_to_yolo(
        multi_df, labeldict, path=train_path, target_name=FLAGS.YOLO_filename
    )

    # Make classes file
    file = open(classes_filename, "w")

    # Sort Dict by Values
    SortedLabelDict = sorted(labeldict.items(), key=lambda x: x[1])
    for elem in SortedLabelDict:
        file.write(elem[0] + "\n")
    file.close()
```

Get_File_Paths.py

```
from os import path, makedirs
import os

"""
For the given path, get the List of all files in the directory tree
https://thispointer.com/python-how-to-get-list-of-files-in-directory-and-sub-directories/
"""


def GetFileList(dirName, endings=[".jpg", ".jpeg", ".png", ".mp4"]):
    # create a list of file and sub directories
    # names in the given directory
    listOfFile = os.listdir(dirName)
    allFiles = list()
    # Make sure all file endings start with a '.'

    for i, ending in enumerate(endings):
        if ending[0] != ".":
            endings[i] = "." + ending
    # Iterate over all the entries
    for entry in listOfFile:
        # Create full path
        fullPath = os.path.join(dirName, entry)
        # If entry is a directory then get the list of files in this directory
        if os.path.isdir(fullPath):
            allFiles = allFiles + GetFileList(fullPath, endings)
        else:
            for ending in endings:
                if entry.endswith(ending):
                    allFiles.append(fullPath)
    return allFiles


def ChangeToOtherMachine(filelist, repo="TrainYourOwnYOLO",
```

```
remote_machine=""):
    """
    Takes a list of file_names located in a repo and changes it to the local machines file names. File must be executed from withing the repository
    Example:

'/home/ubuntu/TrainYourOwnYOLO/Data/Street_View_Images/vulnerable/test.jpg'
    Get's converted to


'C:/Users/Anton/TrainYourOwnYOLO/Data/Street_View_Images/vulnerable/test.jpg'
    """
    filelist = [x.replace("\\", "/") for x in filelist]
    if repo[-1] == "/":
        repo = repo[:-1]
    if remote_machine:
        prefix = remote_machine.replace("\\", "/")
    else:
        prefix = ((os.path.dirname(os.path.abspath(__file__)).split(repo))[0]).replace(
            "\\", "/"
        )
    new_list = []

    for file in filelist:
        suffix = (file.split(repo))[1]
        if suffix[0] == "/":
            suffix = suffix[1:]
        new_list.append(os.path.join(prefix, repo + "/", suffix).replace("\\", "/"))
    return new_list
```

Download_Weights.py

```
import requests
```

```
import os
import progressbar


def download_file_from_google_drive(id, destination):
    def get_confirm_token(response):
        for key, value in response.cookies.items():
            if key.startswith("download_warning"):
                return value

        return None

    def save_response_content(response, destination):
        CHUNK_SIZE = 32768

        with open(destination, "wb") as f:
            bar =
progressbar.ProgressBar(max_value=progressbar.UnknownLength)
            i = 0
            for chunk in response.iter_content(CHUNK_SIZE):
                if chunk:  # filter out keep-alive new chunks
                    bar.update(i)
                    i += 1
                    f.write(chunk)

    URL = "https://docs.google.com/uc?export=download"

    session = requests.Session()

    response = session.get(URL, params={"id": id}, stream=True)
    token = get_confirm_token(response)

    if token:
        params = {"id": id, "confirm": token}
        response = session.get(URL, params=params, stream=True)

    save_response_content(response, destination)


if __name__ == "__main__":
```

```
    import sys

    if len(sys.argv) is not 3:
        print("Usage: python google_drive.py drive_file_id destination_file_path")
    else:
        # TAKE ID FROM SHAREABLE LINK
        file_id = sys.argv[1]
        # DESTINATION FILE ON YOUR DISK
        destination = os.path.join(os.getcwd(), sys.argv[2])
        download_file_from_google_drive(file_id, destination)
```

utils.py

```
import colorsys

import cv2 as cv
import h5py
from keras import Model
import numpy as np
import os
from matplotlib.colors import rgb_to_hsv, hsv_to_rgb
from PIL import Image, ImageFont, ImageDraw
from timeit import default_timer as timer
import random
# import readline
# readline.parse_and_bind("tab: complete")

min_logo_size = (10, 10)


def detect_object(yolo, img_path, save_img, save_img_path="./", postfix=""):
    """
    Call YOLO logo detector on input image, optionally save resulting image.
    Args:
      yolo: keras-yolo3 initialized YOLO instance
      img_path: path to image file
      save_img: bool to save annotated image
```

```
25        save_img_path: path to directory where to save image
26        postfix: string to add to filenames
27      Returns:
28        prediction: list of bounding boxes in format
    (xmin,ymin,xmax,ymax,class_id,confidence)
29        image: unaltered input image as (H,W,C) array
30      """
31      try:
32          image = Image.open(img_path)
33          if image.mode != "RGB":
34              image = image.convert("RGB")
35          image_array = np.array(image)
36      except:
37          print("File Open Error! Try again!")
38          return None, None
39
40      prediction, new_image = yolo.detect_image(image)
41
42      img_out =
    postfix.join(os.path.splitext(os.path.basename(img_path)))
43      lat= random.uniform(-90.00, 90.00)
44      lon= random.uniform(-180.00,180.00)
45      if save_img:
46          new_image.save(os.path.join(save_img_path, img_out))
47
48      return prediction, image_array,lat,lon
49
50
51  def parse_input():
52      """
53      Ask user input for input images: pass path to individual
    images, directory
54      """
55      out = []
56      while True:
57          ins = input("Enter path (q to quit):").strip()
58          if ins in ["q", "quit"]:
59              break
60          if not os.path.exists(ins):
61              print("Error: file not found!")
```

```
        elif os.path.isdir(ins):
            out = [
                os.path.abspath(os.path.join(ins, f))
                for f in os.listdir(ins)
                if f.endswith((".jpg", ".png"))
            ]
            break
        elif ins.endswith((".jpg", ".png")):
            out.append(os.path.abspath(ins))
        print(out)
    return out


def load_extractor_model(model_name="InceptionV3", flavor=1):
    """Load variant of InceptionV3 or VGG16 model specified.
    Args:
      model_name: string, either InceptionV3 or VGG16
      flavor: int specifying the model variant and input_shape.
        For InceptionV3, the map is {0: default, 1: 200*200, truncate last Inception block,
        2: 200*200, truncate last 2 blocks, 3: 200*200, truncate last 3 blocks, 4: 200*200}
        For VGG16, it only changes the input size, {0: 224 (default), 1: 128, 2: 64}.
"""
    start = timer()
    if model_name == "InceptionV3":
        from keras.applications.inception_v3 import InceptionV3
        from keras.applications.inception_v3 import preprocess_input

        model = InceptionV3(weights="imagenet", include_top=False)

        trunc_layer = [-1, 279, 248, 228, -1]
        i_layer = flavor
        model_out = Model(
            inputs=model.inputs, outputs=model.layers[trunc_layer[i_layer]].output
        )
```

```
96          input_shape = (299, 299, 3) if flavor == 0 else (200,
    200, 3)
97
98      elif model_name == "VGG16":
99          from keras.applications.vgg16 import VGG16
100          from keras.applications.vgg16 import preprocess_input
101
102          model_out = VGG16(weights="imagenet", include_top=False)
103          input_length = [224, 128, 64][flavor]
104          input_shape = (input_length, input_length, 3)
105
106      end = timer()
107      print("Loaded {} feature extractor in
    {:.2f}sec".format(model_name, end - start))
108      return model_out, preprocess_input, input_shape
109
110
111 def chunks(l, n, preprocessing_function=None):
112      """Yield successive n-sized chunks from l.
113      General purpose function modified for Keras: made infinite
    loop,
114      add preprocessing, returns np.array instead of list
115      Args:
116        l: iterable
117        n: number of items to take for each chunk
118        preprocessing_function: function that processes image (3D
    array)
119      Returns:
120        generator with n-sized np.array preprocessed chunks of the
    input
121      """
122
123      func = (lambda x: x) if (preprocessing_function is None)
    else preprocessing_function
124
125      # in predict_generator, steps argument sets how many times
    looped through "while True"
126      while True:
127          for i in range(0, len(l), n):
128              yield np.array([func(el) for el in l[i : i + n]])
```

```
129
130
131 def load_features(filename):
132     """
133     Load pre-saved HDF5 features for all logos in the
  LogosInTheWild database
134     """
135
136     start = timer()
137     # get database features
138     with h5py.File(filename, "r") as hf:
139         brand_map = list(hf.get("brand_map"))
140         input_shape = list(hf.get("input_shape"))
141         features = hf.get("features")
142         features = np.array(features)
143     end = timer()
144     print(
145         "Loaded {} features from {} in {:.2f}sec".format(
146             features.shape, filename, end - start
147         )
148     )
149
150     return features, brand_map, input_shape
151
152
153 def save_features(filename, features, brand_map, input_shape):
154     """
155     Save features to compressed HDF5 file for later use
156     """
157
158     print("Saving {} features into {}...
  ".format(features.shape, filename), end="")
159     # reduce file size by saving as float16
160     features = features.astype(np.float16)
161     start = timer()
162     with h5py.File(filename, "w") as hf:
163         hf.create_dataset("features", data=features,
  compression="lzf")
164         hf.create_dataset("brand_map", data=brand_map)
165         hf.create_dataset("input_shape", data=input_shape)
```

```
166
167     end = timer()
168     print("done in {:.2f}sec".format(end - start))
169
170     return None
171
172
173 def features_from_image(img_array, model, preprocess,
    batch_size=100):
174     """
175     Extract features from image array given a decapitated keras
    model.
176     Use a generator to avoid running out of memory for large
    inputs.
177     Args:
178       img_array: (N, H, W, C) list/array of input images
179       model: keras model, outputs
180     Returns:
181       features: (N, F) array of 1D features
182     """
183
184     if len(img_array) == 0:
185         return np.array([])
186
187     steps = len(img_array) // batch_size + 1
188     img_gen = chunks(img_array, batch_size,
    preprocessing_function=preprocess)
189     features = model.predict_generator(img_gen, steps=steps)
190
191     # if the generator has looped past end of array, cut it down
192     features = features[: len(img_array)]
193
194     # reshape features: flatten last three dimensions to one
195     features = features.reshape(features.shape[0],
    np.prod(features.shape[1:]))
196     return features
197
198
199 ###################################################
200 # image processing and bounding box functions
```

```
201 ################################################
202
203
204 def pad_image(img, shape, mode="constant_mean"):
205     """
206     Resize and pad image to given size.
207     Args:
208       img: (H, W, C) input numpy array
209       shape: (H', W') destination size
210       mode: filling mode for new padded pixels. Default =
    'constant_mean' returns
211         grayscale padding with pixel intensity equal to mean of
    the array. Other
212         options include np.pad() options, such as 'edge', 'mean'
    (by row/column)...
213     Returns:
214       new_im: (H', W', C) padded numpy array
215     """
216     if mode == "constant_mean":
217         mode_args = {"mode": "constant", "constant_values":
    np.mean(img)}
218     else:
219         mode_args = {"mode": mode}
220
221     ih, iw = img.shape[:2]
222     h, w = shape[:2]
223
224     # first rescale image so that largest dimension matches
    target
225     scale = min(w / iw, h / ih)
226     nw, nh = int(iw * scale), int(ih * scale)
227     img = cv.resize(img, (nw, nh))
228
229     # center-pad rest of image: compute padding and split in two
230     xpad, ypad = shape[1] - nw, shape[0] - nh
231     xpad = (xpad // 2, xpad // 2 + xpad % 2)
232     ypad = (ypad // 2, ypad // 2 + ypad % 2)
233
234     new_im = np.pad(img, pad_width=(ypad, xpad, (0, 0)),
    **mode_args)
```

```
235
236     return new_im
237
238
239 def bbox_colors(n):
240     """
241     Define n distinct bounding box colors
242     Args:
243       n: number of colors
244     Returns:
245       colors: (n, 3) np.array with RGB integer values in [0-255]
    range
246     """
247     hsv_tuples = [(x / n, 1.0, 1.0) for x in range(n)]
248     colors = 255 * np.array([colorsys.hsv_to_rgb(*x) for x in
    hsv_tuples])
249
250     np.random.seed(10101)  # Fixed seed for consistent colors
    across runs.
251     np.random.shuffle(colors)  # Shuffle colors to decorrelate
    adjacent classes.
252     np.random.seed(None)  # Reset seed to default.
253
254     return colors.astype(int)
255
256
257 def contents_of_bbox(img, bbox_list, expand=1.0):
258     """
259     Extract portions of image inside  bounding boxes list.
260     Args:
261       img: (H,W,C) image array
262       bbox_list: list of bounding box specifications, with first
    4 elements
263       specifying box corners in (xmin, ymin, xmax, ymax) format.
264     Returns:
265       candidates: list of 3D image arrays
266       i_candidates_too_small: list of indices of small
    candidates dropped
267     """
268
```

```
269     candidates = []
270     i_candidates_too_small = []
271     for i, (xmin, ymin, xmax, ymax, *_) in enumerate(bbox_list):
272
273         # for very low confidence sometimes logos found outside
    of the image
274         if ymin > img.shape[0] or xmin > img.shape[1]:
275             continue
276
277         xmin, ymin = int(xmin // expand), int(ymin // expand)
278         xmax, ymax = int(np.round(xmax // expand)),
    int(np.round(ymax // expand))
279
280         # do not even consider tiny logos
281         if xmax - xmin > min_logo_size[1] and ymax - ymin >
    min_logo_size[0]:
282             candidates.append(img[ymin:ymax, xmin:xmax])
283         else:
284             i_candidates_too_small.append(i)
285
286     return candidates, i_candidates_too_small
287
288
289 def draw_annotated_box(image, box_list_list, label_list,
    color_list):
290     """
291     Draw box and overhead label on image.
292     Args:
293       image: PIL image object
294       box_list_list: list of lists of bounding boxes, one for
    each label, each box in
295         (xmin, ymin, xmax, ymax [, score]) format (where score
    is an optional float)
296       label_list: list of  string to go above box
297       color_list: list of RGB tuples
298     Returns:
299       image: annotated PIL image object
300     """
301
302     font_path = os.path.join(
```

```
303         os.path.dirname(__file__), "keras_yolo3/font/FiraMono-
    Medium.otf"
304     )
305     font = ImageFont.truetype(
306         font=font_path, size=np.floor(3e-2 * image.size[1] +
    0.5).astype("int32")
307     )
308     thickness = (image.size[0] + image.size[1]) // 300
309
310     draw = ImageDraw.Draw(image)
311
312     for box_list, label, color in zip(box_list_list, label_list,
    color_list):
313         if not isinstance(color, tuple):
314             color = tuple(color)
315         for box in box_list:
316             # deal with empty predictions
317             if len(box) < 4:
318                 continue
319
320             # if score is also passed, append to label
321             thelabel = "{}".format(label)
322             if len(box) > 4:
323                 thelabel += " {:.2f}".format(box[-1])
324             label_size = draw.textsize(thelabel, font)
325
326             xmin, ymin, xmax, ymax = box[:4]
327             ymin = max(0, np.floor(ymin + 0.5).astype("int32"))
328             xmin = max(0, np.floor(xmin + 0.5).astype("int32"))
329             ymax = min(image.size[1], np.floor(ymax +
    0.5).astype("int32"))
330             xmax = min(image.size[0], np.floor(xmax +
    0.5).astype("int32"))
331
332             if ymin - label_size[1] >= 0:
333                 text_origin = np.array([xmin, ymin -
    label_size[1]])
334             else:
335                 text_origin = np.array([xmin, ymax])
336
```

```
337             for i in range(thickness):
338                 draw.rectangle([xmin + i, ymin + i, xmax - i,
   ymax - i], outline=color)
339             draw.rectangle(
340                 [tuple(text_origin), tuple(text_origin +
   label_size)], fill=color
341             )
342             draw.text(text_origin, thelabel, fill=(0, 0, 0),
   font=font)
343
344     del draw
345
346     return image
```

Train_YOLO.py

```
1  import argparse
2  import os
3  import sys
4  import warnings
5
6
7  def get_parent_dir(n=1):
8      """ returns the n-th parent dicrectory of the current
9      working directory """
10     current_path = os.path.dirname(os.path.abspath(__file__))
11     for k in range(n):
12         current_path = os.path.dirname(current_path)
13     return current_path
14
15
16 src_path = os.path.join(get_parent_dir(0), "src")
17 sys.path.append(src_path)
18
19 utils_path = os.path.join(get_parent_dir(1), "Utils")
20 sys.path.append(utils_path)
21
22 import pickle
23 from time import time
24
```

```
25 import keras.backend as K
26 import numpy as np
27 import tensorflow.compat.v1 as tf
28 from keras.callbacks import (EarlyStopping, ModelCheckpoint,
   ReduceLROnPlateau,
29                              TensorBoard)
30 from keras.layers import Input, Lambda
31 from keras.models import Model
32 from keras.optimizers import Adam
33 from keras_yolo3.yolo3.model import (preprocess_true_boxes,
   tiny_yolo_body,
34                                      yolo_body, yolo_loss)
35 from keras_yolo3.yolo3.utils import get_random_data
36 from Train_Utils import (ChangeToOtherMachine, create_model,
   create_tiny_model,
37                          data_generator, data_generator_wrapper,
   get_anchors,
38                          get_classes)
39
40 keras_path = os.path.join(src_path, "keras_yolo3")
41 Data_Folder = os.path.join(get_parent_dir(1), "Data")
42 Image_Folder = os.path.join(Data_Folder, "Source_Images",
   "Training_Images")
43 VoTT_Folder = os.path.join(Image_Folder, "vott-csv-export")
44 YOLO_filename = os.path.join(VoTT_Folder, "data_train.txt")
45
46 Model_Folder = os.path.join(Data_Folder, "Model_Weights")
47 YOLO_classname = os.path.join(Model_Folder, "data_classes.txt")
48
49 log_dir = Model_Folder
50 anchors_path = os.path.join(keras_path, "model_data",
   "yolo_anchors.txt")
51 weights_path = os.path.join(keras_path, "yolo.h5")
52
53 FLAGS = None
54
55 if __name__ == "__main__":
56     # Delete all default flags
57     parser =
   argparse.ArgumentParser(argument_default=argparse.SUPPRESS)
```

```
    """
    Command line options
    """

    parser.add_argument(
        "--annotation_file",
        type=str,
        default=YOLO_filename,
        help="Path to annotation file for Yolo. Default is " +
YOLO_filename,
    )
    parser.add_argument(
        "--classes_file",
        type=str,
        default=YOLO_classname,
        help="Path to YOLO classnames. Default is " +
YOLO_classname,
    )

    parser.add_argument(
        "--log_dir",
        type=str,
        default=log_dir,
        help="Folder to save training logs and trained weights
to. Default is "
        + log_dir,
    )

    parser.add_argument(
        "--anchors_path",
        type=str,
        default=anchors_path,
        help="Path to YOLO anchors. Default is " + anchors_path,
    )

    parser.add_argument(
        "--weights_path",
        type=str,
        default=weights_path,
        help="Path to pre-trained YOLO weights. Default is " +
```

```
   weights_path,
95     )
96     parser.add_argument(
97         "--val_split",
98         type=float,
99         default=0.1,
100          help="Percentage of training set to be used for
   validation. Default is 10%.",
101     )
102     parser.add_argument(
103         "--is_tiny",
104         default=False,
105         action="store_true",
106         help="Use the tiny Yolo version for better performance
   and less accuracy. Default is False.",
107     )
108     parser.add_argument(
109         "--random_seed",
110         type=float,
111         default=None,
112         help="Random seed value to make script deterministic.
   Default is 'None', i.e. non-deterministic.",
113     )
114     parser.add_argument(
115         "--epochs",
116         type=float,
117         default=51,
118         help="Number of epochs for training last layers and
   number of epochs for fine-tuning layers. Default is 51.",
119     )
120     parser.add_argument(
121         "--warnings",
122         default=False,
123         action="store_true",
124         help="Display warning messages. Default is False.",
125     )
126
127     FLAGS = parser.parse_args()
128
129     if not FLAGS.warnings:
```

```
130         tf.logging.set_verbosity(tf.logging.ERROR)
131         os.environ['TF_CPP_MIN_LOG_LEVEL']='3'
132         warnings.filterwarnings("ignore")
133 
134     np.random.seed(FLAGS.random_seed)
135 
136     log_dir = FLAGS.log_dir
137 
138     class_names = get_classes(FLAGS.classes_file)
139     num_classes = len(class_names)
140     anchors = get_anchors(FLAGS.anchors_path)
141     weights_path = FLAGS.weights_path
142 
143     input_shape = (416, 416)  # multiple of 32, height, width
144     epoch1, epoch2 = FLAGS.epochs, FLAGS.epochs
145 
146     is_tiny_version = len(anchors) == 6  # default setting
147     if FLAGS.is_tiny:
148         model = create_tiny_model(
149             input_shape, anchors, num_classes, freeze_body=2,
  weights_path=weights_path
150         )
151     else:
152         model = create_model(
153             input_shape, anchors, num_classes, freeze_body=2,
  weights_path=weights_path
154         )  # make sure you know what you freeze
155 
156     log_dir_time = os.path.join(log_dir,
  "{}".format(int(time())))
157     logging = TensorBoard(log_dir=log_dir_time)
158     checkpoint = ModelCheckpoint(
159         os.path.join(log_dir, "checkpoint.h5"),
160         monitor="val_loss",
161         save_weights_only=True,
162         save_best_only=True,
163         period=5,
164     )
165     reduce_lr = ReduceLROnPlateau(monitor="val_loss",
  factor=0.1, patience=3, verbose=1)
```

```
    early_stopping = EarlyStopping(
        monitor="val_loss", min_delta=0, patience=10, verbose=1
    )

    val_split = FLAGS.val_split
    with open(FLAGS.annotation_file) as f:
        lines = f.readlines()

    # This step makes sure that the path names correspond to the local machine
    # This is important if annotation and training are done on different machines (e.g. training on AWS)
    lines = ChangeToOtherMachine(lines, remote_machine="")
    np.random.shuffle(lines)
    num_val = int(len(lines) * val_split)
    num_train = len(lines) - num_val

    # Train with frozen layers first, to get a stable loss.
    # Adjust num epochs to your dataset. This step is enough to obtain a decent model.
    if True:
        model.compile(
            optimizer=Adam(lr=1e-3),
            loss={
                # use custom yolo_loss Lambda layer.
                "yolo_loss": lambda y_true, y_pred: y_pred
            },
        )

        batch_size = 32
        print(
            "Train on {} samples, val on {} samples, with batch size {}.".format(
                num_train, num_val, batch_size
            )
        )
        history = model.fit_generator(
            data_generator_wrapper(
                lines[:num_train], batch_size, input_shape, anchors, num_classes
```

```
201             ),
202             steps_per_epoch=max(1, num_train // batch_size),
203             validation_data=data_generator_wrapper(
204                 lines[num_train:], batch_size, input_shape,
  anchors, num_classes
205             ),
206             validation_steps=max(1, num_val // batch_size),
207             epochs=epoch1,
208             initial_epoch=0,
209             callbacks=[logging, checkpoint],
210         )
211         model.save_weights(os.path.join(log_dir,
  "trained_weights_stage_1.h5"))
212 
213         step1_train_loss = history.history["loss"]
214 
215         file = open(os.path.join(log_dir_time,
  "step1_loss.npy"), "w")
216         with open(os.path.join(log_dir_time, "step1_loss.npy"),
  "w") as f:
217             for item in step1_train_loss:
218                 f.write("%s\n" % item)
219         file.close()
220 
221         step1_val_loss = np.array(history.history["val_loss"])
222 
223         file = open(os.path.join(log_dir_time,
  "step1_val_loss.npy"), "w")
224         with open(os.path.join(log_dir_time,
  "step1_val_loss.npy"), "w") as f:
225             for item in step1_val_loss:
226                 f.write("%s\n" % item)
227         file.close()
228 
229     # Unfreeze and continue training, to fine-tune.
230     # Train longer if the result is unsatisfactory.
231     if True:
232         for i in range(len(model.layers)):
233             model.layers[i].trainable = True
234         model.compile(
```

```
235             optimizer=Adam(lr=1e-4), loss={"yolo_loss": lambda
    y_true, y_pred: y_pred}
236         )  # recompile to apply the change
237         print("Unfreeze all layers.")
238 
239         batch_size = (
240             4  # note that more GPU memory is required after
    unfreezing the body
241         )
242         print(
243             "Train on {} samples, val on {} samples, with batch
    size {}.".format(
244                 num_train, num_val, batch_size
245             )
246         )
247         history = model.fit_generator(
248             data_generator_wrapper(
249                 lines[:num_train], batch_size, input_shape,
    anchors, num_classes
250             ),
251             steps_per_epoch=max(1, num_train // batch_size),
252             validation_data=data_generator_wrapper(
253                 lines[num_train:], batch_size, input_shape,
    anchors, num_classes
254             ),
255             validation_steps=max(1, num_val // batch_size),
256             epochs=epoch1 + epoch2,
257             initial_epoch=epoch1,
258             callbacks=[logging, checkpoint, reduce_lr,
    early_stopping],
259         )
260         model.save_weights(os.path.join(log_dir,
    "trained_weights_final.h5"))
261         step2_train_loss = history.history["loss"]
262 
263         file = open(os.path.join(log_dir_time,
    "step2_loss.npy"), "w")
264         with open(os.path.join(log_dir_time, "step2_loss.npy"),
    "w") as f:
265             for item in step2_train_loss:
```

```
                f.write("%s\n" % item)
        file.close()

        step2_val_loss = np.array(history.history["val_loss"])

        file = open(os.path.join(log_dir_time,
  "step2_val_loss.npy"), "w")
        with open(os.path.join(log_dir_time,
  "step2_val_loss.npy"), "w") as f:
            for item in step2_val_loss:
                f.write("%s\n" % item)
        file.close()
```

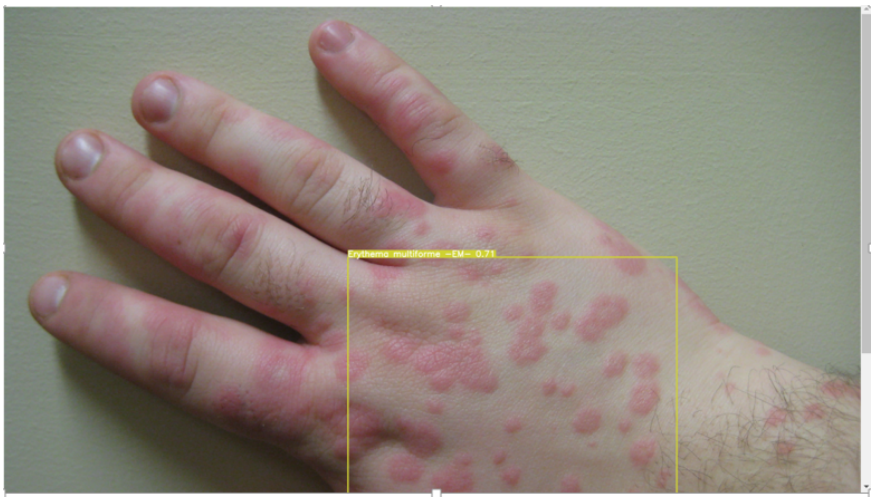
8. TESTING

8.1 TEST CASES

Test Case- I: Upload The picture of affected area
Precondition: The application should be open
Assumptions: All the datasets are available
Test steps: 1) Register and login 2) Upload the image
Expected Result: The predicted result should be displayed in the prediction page

8.2 USER ACCEPTANCE TESTING

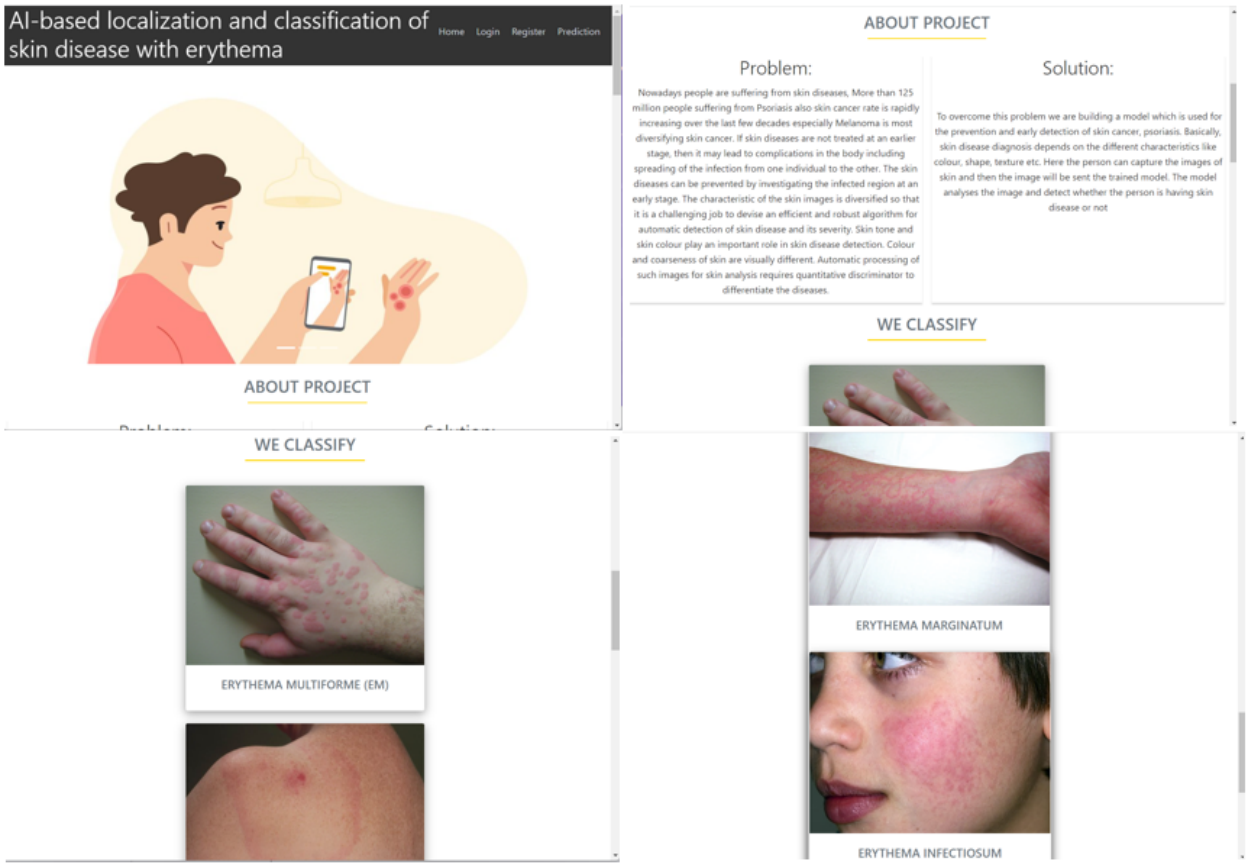
we have created the application and the prediction process is carried out successfully.



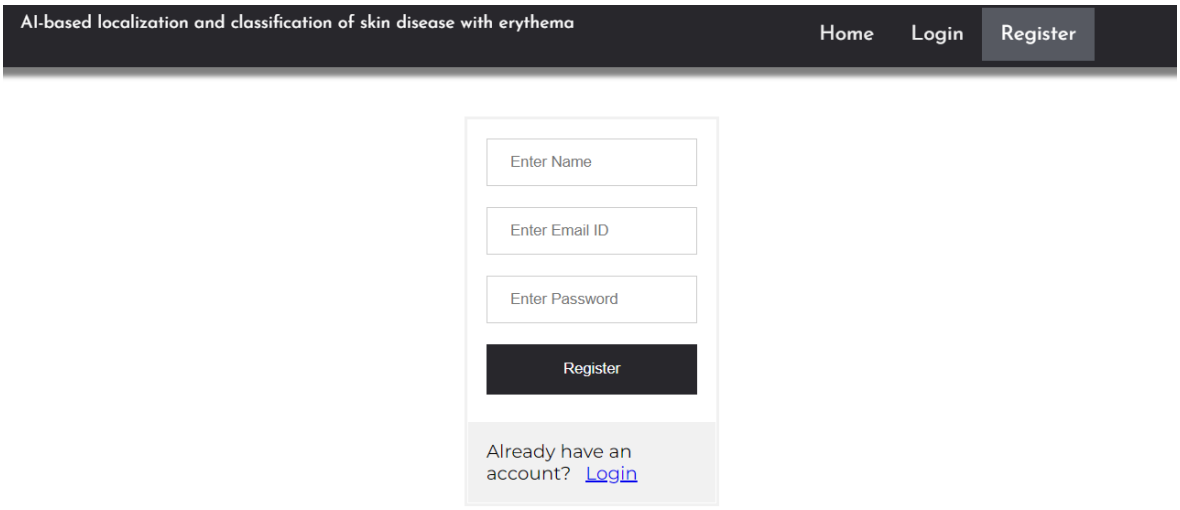
9. RESULTS

So finally when we run the python code it is going to connect the IBM Watson platform and we can able to view the predicted result.

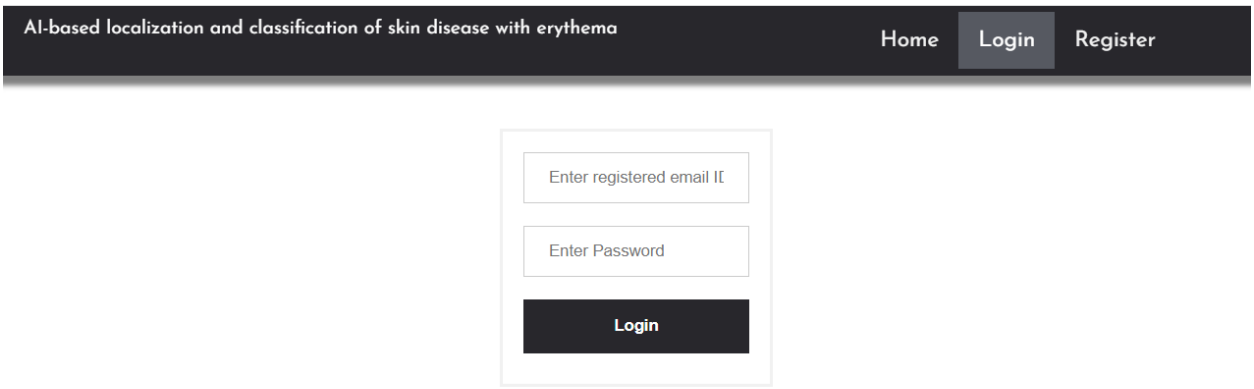
Step 1: This is the interface of our application.



Step 2: New user should register with their information.



Step3: Login using the login page.



Step4: Upload image of the affected area

Skin Disease Detection

Home Logout

AI-based localization and classification of skin disease with erythema

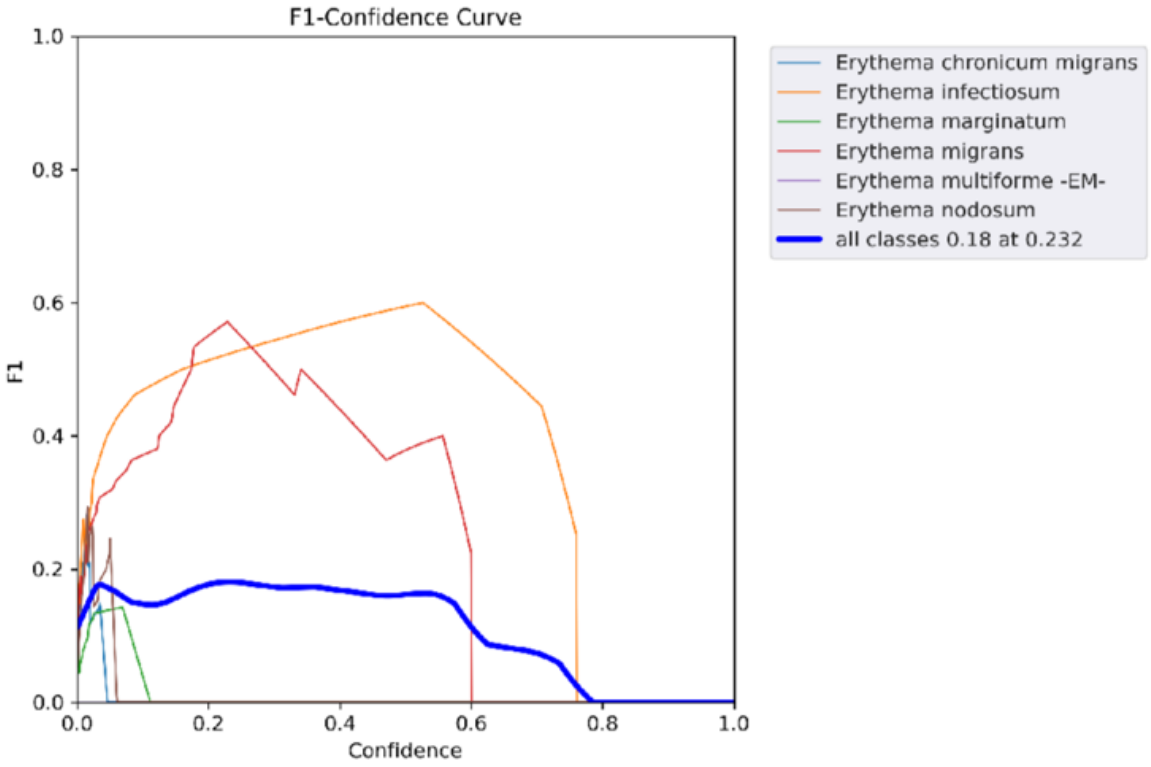
Nowadays people are suffering from skin diseases, More than 125 million people suffering from Psoriasis also skin cancer rate is rapidly increasing over the last few decades especially Melanoma is most diversifying skin cancer. If skin diseases are not treated at an earlier stage, then it may lead to complications in the body including spreading of the infection from one individual to the other. The skin diseases can be prevented by investigating the infected region at an early stage. The characteristic of the skin images is diversified so that it is a challenging job to devise an efficient and robust algorithm for automatic detection of skin disease and its severity. Skin tone and skin colour play an important role in skin disease detection. Colour and coarseness of skin are visually different. Automatic processing of such images for skin analysis requires quantitative discriminator to differentiate the diseases.

Click here for Prediction

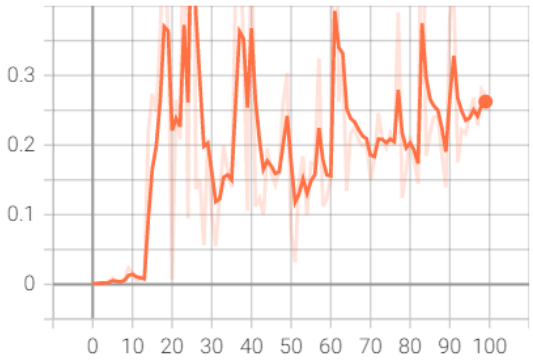
Step5: The predicted result is displayed

9.1 PERFORMANCE METRICS

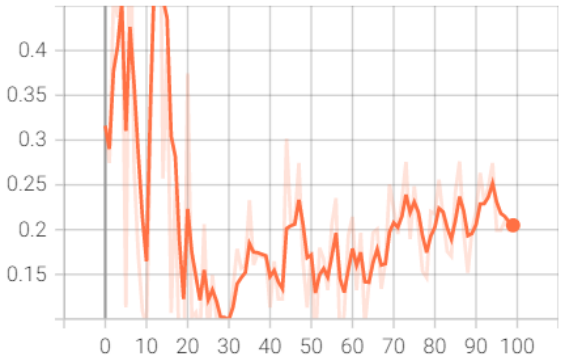
tag: F1_curve
step **99**
Fri Nov 18 2022 18:35:50 GMT+0530 (India Standard Time)



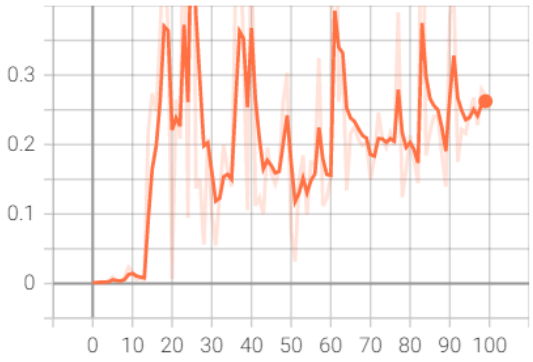
metrics/precision
tag: metrics/precision



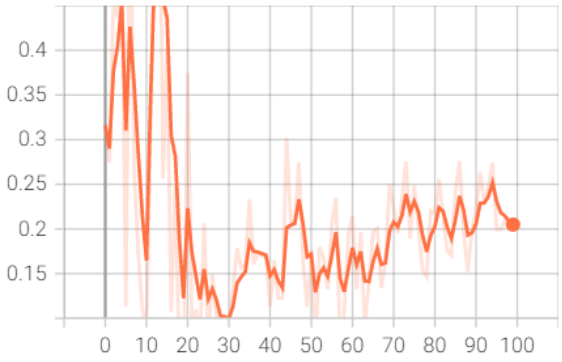
metrics/recall
tag: metrics/recall

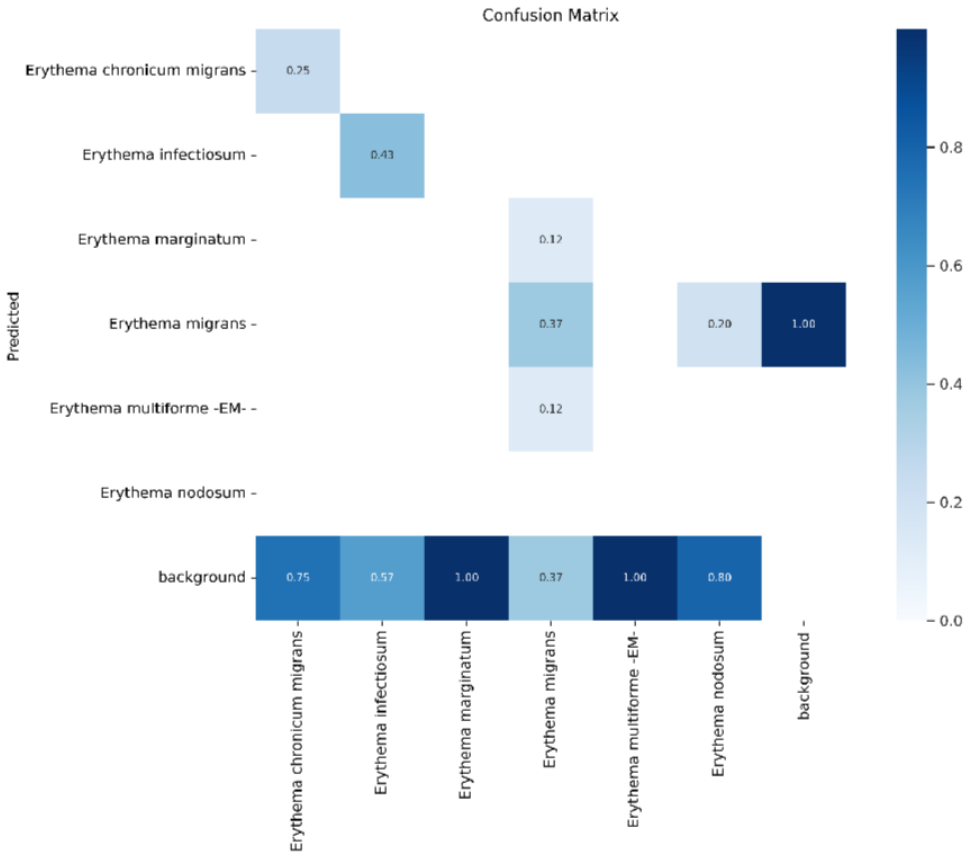


metrics/precision
tag: metrics/precision



metrics/recall
tag: metrics/recall





10. ADVANTAGES & DISADVANTAGES

ADVANTAGES:

- We have demonstrated that adequate accuracy rates can be attained even in the absence of a huge dataset and high-quality photos.
- Knowing the location of the disease through accurate segmentation is helpful for preparing data used for classification.

DISADVANTAGES:

- our model is most effective with camera images of skin diseases with erythema, which is a limitation of our study.
- People with no knowledge of using mobile phone will find it difficult to use.

11. CONCLUSION

The web application is successfully created, user needs to provide information, register and login, which is stored and the data is input for the trained algorithms. Here we used algorithms which will produce better accuracy . And finally displayed the output in new html page like if the patient has a condition of erythema otherwise it displays as your skin condition is not erythema . The application is tested fine and properly debugged.

12. FUTURE SCOPE

For future work, we plan tests that aim to show the medication that a patient can take for treatment. Also, we are looking to link this website to various hospitals and pharmacies for easy use.

13. APPENDIX

Source Code

```
import re
import numpy as np
import os
from flask import Flask, app,request,render_template
```

```
import sys
from flask import Flask, request, render_template, redirect,
url_for
import argparse
from tensorflow import keras
from PIL import Image
from timeit import default_timer as timer
import test
import pandas as pd
import numpy as np
import random

def get_parent_dir(n=1):
    """ returns the n-th parent dicrectory of the current
    working directory """
    current_path = os.path.dirname(os.path.abspath(__file__))
    for k in range(n):
        current_path = os.path.dirname(current_path)
    return current_path


src_path =r'C:\Users\manik\Desktop\yolo_structure\yolo_structure-
master\2_Training\src'
print(src_path)
utils_path =
r'C:\Users\manik\Desktop\yolo_structure\yolo_structure-
master\Utils'
print(utils_path)

sys.path.append(src_path)
sys.path.append(utils_path)

import argparse
from keras_yolo3.yolo import YOLO, detect_video
from PIL import Image
from timeit import default_timer as timer
from utils import load_extractor_model, load_features,
parse_input, detect_object
import test
import utils
```

```
40 import pandas as pd
41 import numpy as np
42 from Get_File_Paths import GetFileList
43 import random
44
45 os.environ["TF_CPP_MIN_LOG_LEVEL"] = "3"
46
47 # Set up folder names for default values
48 data_folder = os.path.join(get_parent_dir(n=1), "Skin Disease-
   Flask", "Data")
49
50 image_folder = os.path.join(data_folder, "Source_Images")
51
52 image_test_folder = os.path.join(image_folder, "Test_Images")
53
54 detection_results_folder = os.path.join(image_folder,
   "Test_Image_Detection_Results")
55 detection_results_file = os.path.join(detection_results_folder,
   "Detection_Results.csv")
56
57 model_folder = os.path.join(data_folder, "Model_Weights")
58
59 model_weights = os.path.join(model_folder,
   "trained_weights_final.h5")
60 model_classes = os.path.join(model_folder, "data_classes.txt")
61
62 anchors_path = os.path.join(src_path, "keras_yolo3",
   "model_data", "yolo_anchors.txt")
63
64 FLAGS = None
65
66
67 from cloudant.client import Cloudant
68
69 # Authenticate using an IAM API key
70 client = Cloudant.iam('2eb40045-a8d6-450d-9d24-52cc7cbb2810-
   bluemix','Ud0wunTPOI_8h5ZtEqi1IXk1gIKeYLmpUsCn0EeO8T4z',
   connect=True)
71
72
```

```python
# Create a database using an initialized client
my_database = client.create_database('my_database')


app=Flask(__name__)

#default home page or route
@app.route('/')
def index():
    return render_template('index.html')



@app.route('/index.html')
def home():
    return render_template("index.html")


#registration page
@app.route('/register')
def register():
    return render_template('register.html')

@app.route('/afterreg', methods=['POST'])
def afterreg():
    x = [x for x in request.form.values()]
    print(x)
     data = {
    '_id': x[1], # Setting _id is optional
    'name': x[0],
    'psw':x[2]
    }
    print(data)

    query = {'_id': {'$eq': data['_id']}}

    docs = my_database.get_query_result(query)
    print(docs)

    print(len(docs.all()))
```

```
113
114     if(len(docs.all())==0):
115         url = my_database.create_document(data)
116         #response = requests.get(url)
117         return render_template('register.html',
  pred="Registration Successful, please login using your details")
118     else:
119         return render_template('register.html', pred="You are
  already a member, please login using your details")
120
121 #login page
122 @app.route('/login')
123 def login():
124     return render_template('login.html')
125
126 @app.route('/afterlogin',methods=['POST'])
127 def afterlogin():
128     user = request.form['_id']
129     passw = request.form['psw']
130     print(user,passw)
131
132     query = {'_id': {'$eq': user}}
133
134     docs = my_database.get_query_result(query)
135     print(docs)
136
137     print(len(docs.all()))
138
139
140     if(len(docs.all())==0):
141         return render_template('login.html', pred="The username
  is not found.")
142     else:
143         if((user==docs[0][0]['_id'] and
  passw==docs[0][0]['psw'])):
144             return redirect(url_for('prediction'))
145         else:
146             print('Invalid User')
147
148
```

```
149 @app.route('/logout')
150 def logout():
151     return render_template('logout.html')
152 
153 @app.route('/prediction')
154 def prediction():
155     return render_template('prediction.html')
156 
157 
158 @app.route('/result',methods=["GET","POST"])
159 def res():
160     # Delete all default flags
161     parser =
  argparse.ArgumentParser(argument_default=argparse.SUPPRESS)
162     """
163     Command line options
164     """
165 
166     parser.add_argument(
167         "--input_path",
168         type=str,
169         default=image_test_folder,
170         help="Path to image/video directory. All subdirectories
  will be included. Default is "
171         + image_test_folder,
172     )
173 
174     parser.add_argument(
175         "--output",
176         type=str,
177         default=detection_results_folder,
178         help="Output path for detection results. Default is "
179         + detection_results_folder,
180     )
181 
182     parser.add_argument(
183         "--no_save_img",
184         default=False,
185         action="store_true",
186         help="Only save bounding box coordinates but do not save
```

```
    output images with annotated boxes. Default is False.",
187     )
188
189     parser.add_argument(
190         "--file_types",
191         "--names-list",
192         nargs="*",
193         default=[],
194         help="Specify list of file types to include. Default is
    --file_types .jpg .jpeg .png .mp4",
195     )
196
197     parser.add_argument(
198         "--yolo_model",
199         type=str,
200         dest="model_path",
201         default=model_weights,
202         help="Path to pre-trained weight files. Default is " +
    model_weights,
203     )
204
205     parser.add_argument(
206         "--anchors",
207         type=str,
208         dest="anchors_path",
209         default=anchors_path,
210         help="Path to YOLO anchors. Default is " + anchors_path,
211     )
212
213     parser.add_argument(
214         "--classes",
215         type=str,
216         dest="classes_path",
217         default=model_classes,
218         help="Path to YOLO class specifications. Default is " +
    model_classes,
219     )
220
221     parser.add_argument(
222         "--gpu_num", type=int, default=1, help="Number of GPU to
    use. Default is 1"
```

```
223     )
224
225     parser.add_argument(
226         "--confidence",
227         type=float,
228         dest="score",
229         default=0.25,
230         help="Threshold for YOLO object confidence score to show
    predictions. Default is 0.25.",
231     )
232
233     parser.add_argument(
234         "--box_file",
235         type=str,
236         dest="box",
237         default=detection_results_file,
238         help="File to save bounding box results to. Default is "
239         + detection_results_file,
240     )
241
242     parser.add_argument(
243         "--postfix",
244         type=str,
245         dest="postfix",
246         default="_disease",
247         help='Specify the postfix for images with bounding
    boxes. Default is "_disease"',
248     )
249
250     FLAGS = parser.parse_args()
251
252     save_img = not FLAGS.no_save_img
253
254     file_types = FLAGS.file_types
255     #print(input_path)
256
257     if file_types:
258         input_paths = GetFileList(FLAGS.input_path,
    endings=file_types)
259         print(input_paths)
```

```
260     else:
261         input_paths = GetFileList(FLAGS.input_path)
262         print(input_paths)
263 
264     # Split images and videos
265     img_endings = (".jpg", ".jpeg", ".png")
266     vid_endings = (".mp4", ".mpeg", ".mpg", ".avi")
267 
268     input_image_paths = []
269     input_video_paths = []
270     for item in input_paths:
271         if item.endswith(img_endings):
272             input_image_paths.append(item)
273         elif item.endswith(vid_endings):
274             input_video_paths.append(item)
275 
276     output_path = FLAGS.output
277     if not os.path.exists(output_path):
278         os.makedirs(output_path)
279 
280     # define YOLO detector
281     yolo = YOLO(
282         **{
283             "model_path": FLAGS.model_path,
284             "anchors_path": FLAGS.anchors_path,
285             "classes_path": FLAGS.classes_path,
286             "score": FLAGS.score,
287             "gpu_num": FLAGS.gpu_num,
288             "model_image_size": (416, 416),
289         }
290     )
291 
292     # Make a dataframe for the prediction outputs
293     out_df = pd.DataFrame(
294         columns=[
295             "image",
296             "image_path",
297             "xmin",
298             "ymin",
299             "xmax",
```

```
            "ymax",
            "label",
            "confidence",
            "x_size",
            "y_size",
        ]
    )

    # labels to draw on images
    class_file = open(FLAGS.classes_path, "r")
    input_labels = [line.rstrip("\n") for line in
  class_file.readlines()]
    print("Found {} input labels: {}
  ...".format(len(input_labels), input_labels))

    if input_image_paths:
        print(
            "Found {} input images: {} ...".format(
                len(input_image_paths),
                [os.path.basename(f) for f in
  input_image_paths[:5]],
            )
        )
        start = timer()
        text_out = ""

        # This is for images
        for i, img_path in enumerate(input_image_paths):
            print(img_path)
            prediction, image,lat,lon= detect_object(
                yolo,
                img_path,
                save_img=save_img,
                save_img_path=FLAGS.output,
                postfix=FLAGS.postfix,
            )
            print(lat,lon)
            y_size, x_size, _ = np.array(image).shape
            for single_prediction in prediction:
                out_df = out_df.append(
```

```
337                     pd.DataFrame(
338                         [
339                             [
340 
  os.path.basename(img_path.rstrip("\n")),
341                                 img_path.rstrip("\n"),
342                             ]
343                             + single_prediction
344                             + [x_size, y_size]
345                         ],
346                         columns=[
347                             "image",
348                             "image_path",
349                             "xmin",
350                             "ymin",
351                             "xmax",
352                             "ymax",
353                             "label",
354                             "confidence",
355                             "x_size",
356                             "y_size",
357                         ],
358                     )
359                 )
360         end = timer()
361         print(
362             "Processed {} images in {:.1f}sec -
  {:.1f}FPS".format(
363                 len(input_image_paths),
364                 end - start,
365                 len(input_image_paths) / (end - start),
366             )
367         )
368         out_df.to_csv(FLAGS.box, index=False)
369 
370     # This is for videos
371     if input_video_paths:
372         print(
373             "Found {} input videos: {} ...".format(
374                 len(input_video_paths),
```

```
                [os.path.basename(f) for f in
  input_video_paths[:5]],
            )
        )
        start = timer()
        for i, vid_path in enumerate(input_video_paths):
            output_path = os.path.join(
                FLAGS.output,
                os.path.basename(vid_path).replace(".",
  FLAGS.postfix + "."),
            )
            detect_video(yolo, vid_path,
  output_path=output_path)

        end = timer()
        print(
            "Processed {} videos in {:.1f}sec".format(
                len(input_video_paths), end - start
            )
        )
    # Close the current yolo session
    yolo.close_session()
    return render_template('prediction.html')


""" Running our application """
if __name__ == "__main__":
    app.run(debug=True)
```

GitHub & Project Demo Link

Github link:

https://github.com/IBM-EPBL/IBM-Project-1491-1658390989

Project Demo Link:

https://drive.google.com/file/d/1taI6JBWVhO6bxdSFp3EoauODUbw2IQSU/view?usp=share_link