SHORT TERM INTERNSHIP

Solar Panel Forecasting

PROJECT TEAM

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- ☐ Deversetty Namrata
- ☐ Arasada Karthik

SOLAR PANEL FORECASTING

Introduction:-

During Our Shor-term internship with Smart Bridge, we have delved into the world of data analytics, with a primary focus on Solar panel forecasting. In this introductory Section, we will provide an Overview of the importance of data Visualization in Conveying insights and Our Objective to Create informative Visnalizations, including dashbord reports and data Stories.

Overview:-

Short-term forecasting provides predictions upto Seven days a head. Due to the power market regulation in many jurisdictions, intra-day forecasts and day-ahead Solar power forecasts are the most imporant time hoizon in this category. Basically all highly accurate Short term forecasting methods leverage Serval elata input Streams Such as metro dogical Variable local weather phonemena and Ground.

Purpose

Solar power forecasting is the process of the gathering and analyzing data in order to predict Solar power generation On Various time horizons with the goal to mitigate the impact of Solar intermittency Solar power forecasts are used for Efficient management of the Electric grid for power trading.

Literature Survey:

Before delving into Our Own works, it is Essential to review the Existing literature On Solar panel forecasting. This Section will provide a comprehensive look at prior research and Established methods in the field. we will Explore how data analytics and Visualization have been applied in the Content of Solar Energy predictions

Existing problem

Slolar penels are not always Efficient in Converting Sunlight into Energy

Solar panels can be damaged by Severe weather also Environment problem Solar panels.

Solar panels require regular maintenance Solar penels Can be aesthetically displeasing Electrical issues ; Solar panels are Connected to the Electrical grid. If not fixed, this Can lead to a loss of power or Even a fine.

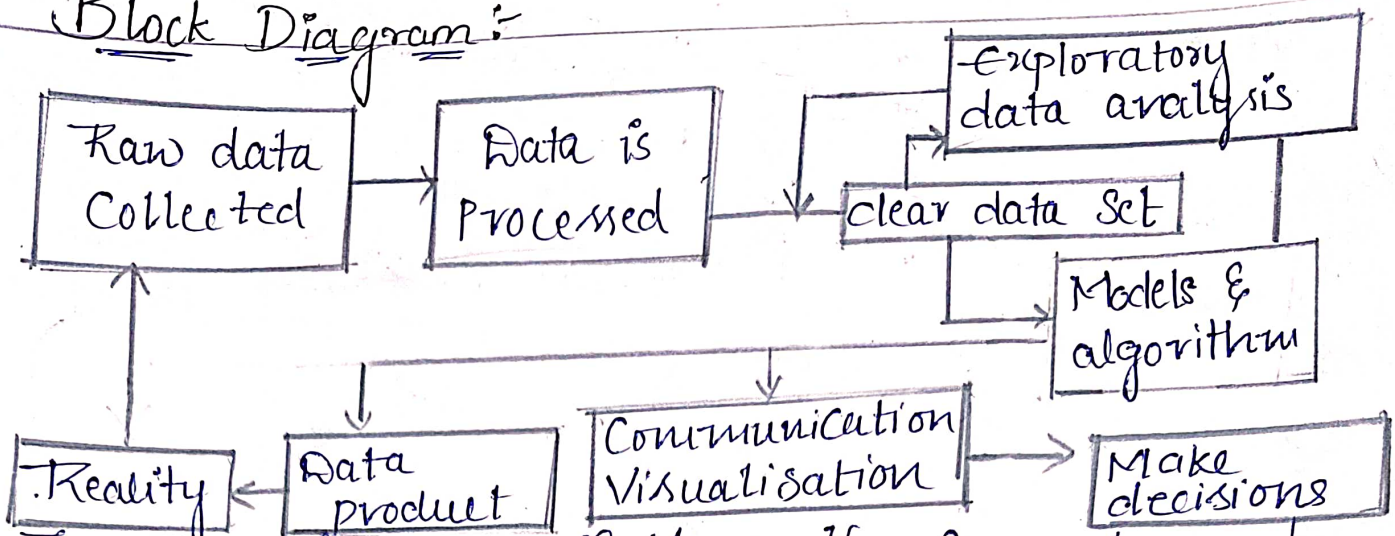
Proposed Solution

Solar forecasting Solutions must leverage a reliable and proven Solar dataset as the basic for delivering a quality forecast. The Solar forecast must be built on a foundation of trusted reliable and accurate solar data

Theoritical Analysis;

In this Section, we will transition from the literature Survey to Our Own theoretical analysis. we will delve into the principles. models and methodologies we have Employed to forecast Solar panel performance.

Block Diagram:-



This is where we Outline the Concepts and theories that underpin Our work including the factors Considered in Solar Energy peiediction.

Hardware/Software designing

Aurora Solar design software that helps Solar Companies quickly design photovoltaic System that are tailored to each clients Specific needs.

Open Solar is a free Solar design, Sales and management Software with a built-in CRM, digital Scheduling, real-time Customer alerts.

The collected data

First hour of period
Is Daylight
Distance to Solar noon.
Average temperature (day)
Average wide direction (day)
Average wind Speed (day)
Sky Cover

Visibility
Humidity
Average wind Speed (period)

Result:

The result section will delve into the specific findings we have uncovered during our internship. It will include a summary of the insights gained from our data visualizations and analytical work. This section should highlight key takeaways from the project, such as notable trends performance indicators and data driven recommendations.

Advantages & Disadvantages

Advantages

- Clear Energy Source
- Reduction in Electricity bill
- Multiple Applications
- Low maintenance cost
- Independent Source of Energy
- Sustainable
- Lower water pollution

Disadvantages

- Installation cost is too high
- Reliability
- Lost of Space required for Installation
- Not Effiient
- Pollution and impact On Environment

Applications.

Our work Extends beyond the theoretical realm, as we aim to apply our finding

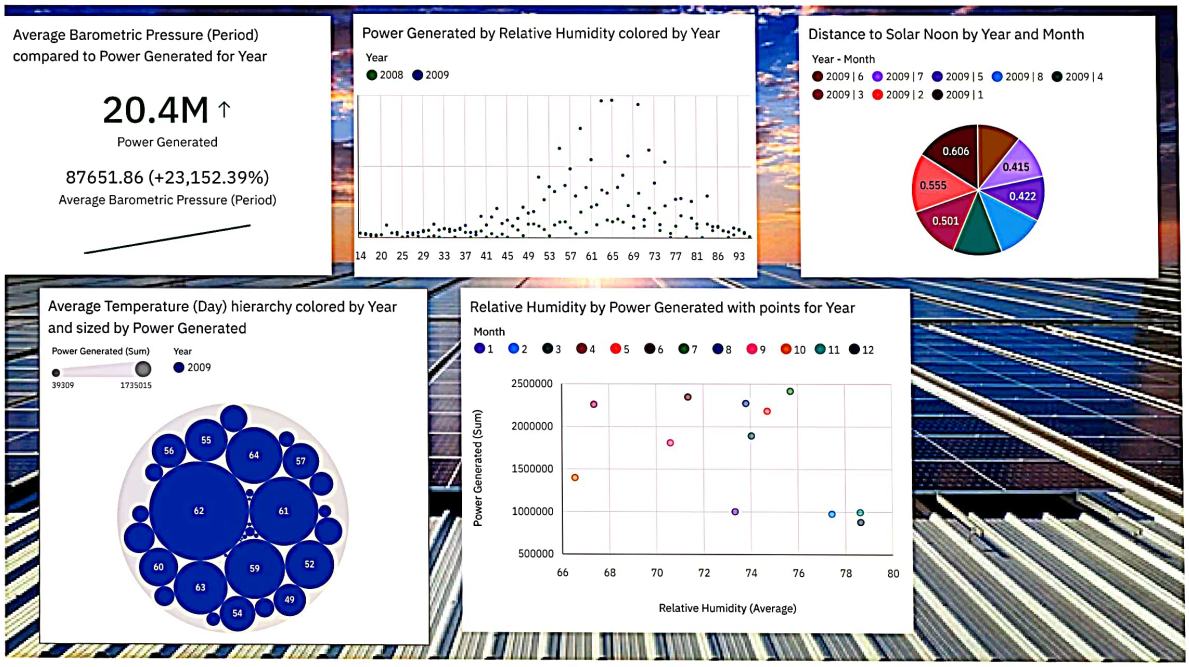
In practical Scenarios This Section will Explore the real-world applications of Solar panel forecasting, including how our data analytics and visualizations can be used in Energy management, Solar panel installation planning and Sustainable Energy initiatives.

Conclusion:

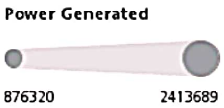
In the Conclusion, we will Summarize the Significance of our internship project with Smart bridge. This Section will Emphasize the value of data analytics and data visualization in the Context of Solar panel forecasting. we will reiterate the key takeaways from our work and highlights its potential impact on the field.

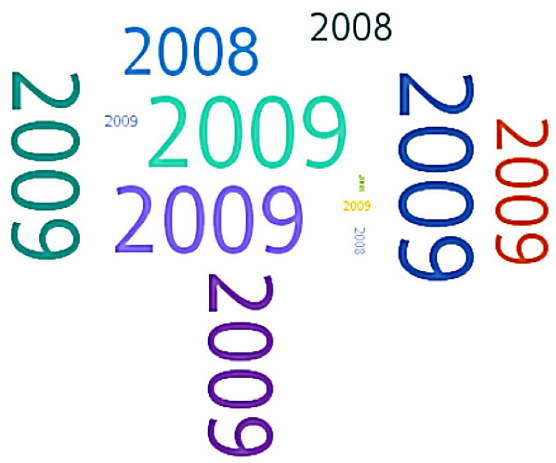
The future Scope Section will provide insights into what lies ahead. we will discuss potential areas for further research and development in Solar panel forecasting as well as how Our work Can Serve as a foundation for future project and innovations. This will Open the door to Ongoing Exploration and improvement in thes Critical field.

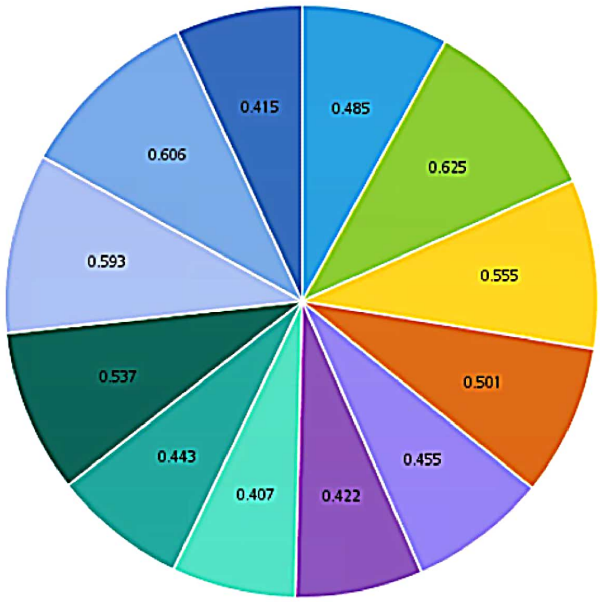
Tab 1

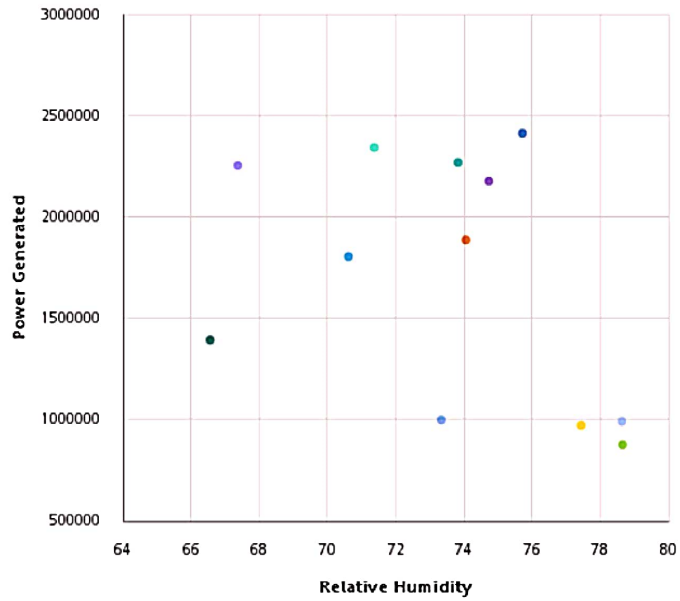

Average Barometric Pressure (Period) compared to Power Generated for Year
20.4M ↑
Power Generated
87651.86 (+23,152.39%)
Average Barometric Pressure (Period)
Power Generated by Relative Humidity colored by Year
Year
2008 2009
14 20 25 29 33 37 41 45 49 53 57 61 65 69 73 77 81 86 93
Distance to Solar Noon by Year and Month
Year - Month
2009 | 6 2009 | 7 2009 | 5 2009 | 8 2009 | 4
2009 | 3 2009 | 2 2009 | 1
0.606
0.415
0.555
0.422
0.501
Average Temperature (Day) hierarchy colored by Year and sized by Power Generated
Power Generated (Sum)
39309
1735015
Year
2009
56 55 64 57 62 61 60 59 52 63 54 49
Relative Humidity by Power Generated with points for Year
Month
1 2 3 4 5 6 7 8 9 10 11 12
Power Generated (Sum)
2500000
2000000
1500000
1000000
500000
66 68 70 72 74 76 78 80
Relative Humidity (Average)

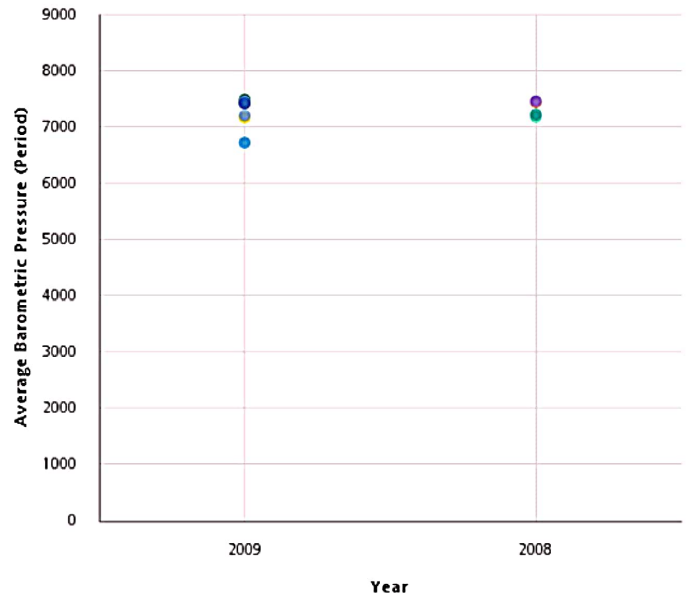
SOLAR FORECASTING REPORT











SOLAR PANEL FORECASTING

Target Value of Average Barometric Pressure

- Year 2009 has the highest values of both Average Barometric Pressure (Period) and Power Generated.
- Add insight to favorites
- The overall number of results for Average Barometric Pressure (Period) is nearly three thousand.
- Add insight to favorites
- 2009 exceeds 2008 in Power Generated by 10,252,561.
- Add insight to favorites

Average Barometric Pressure (Period) compared to Power Generated for Year

20.4M ↑

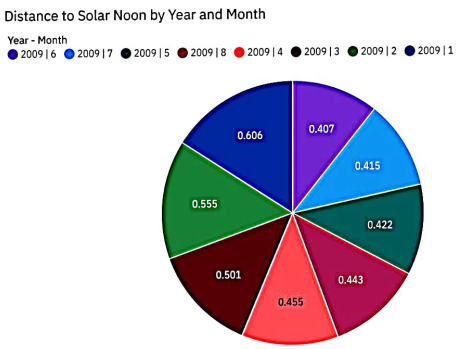
Power Generated

87651.86 (+23,152.39%)

Average Barometric Pressure (Period)

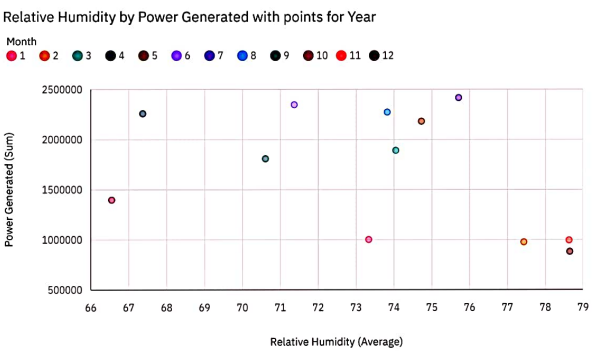
Distance to Solar Noon by Year and Month

- Distance to Solar Noon has a moderate downward trend.
- Add insight to favorites
- Distance to Solar Noon is unusually high when Year - Month is 2009|1.
- Add insight to favorites
- Based on the current forecasting, Distance to Solar Noon may reach 0.4778 by Month 10.
- Add insight to favorites
- Based on the current forecasting, Distance to Solar Noon may reach



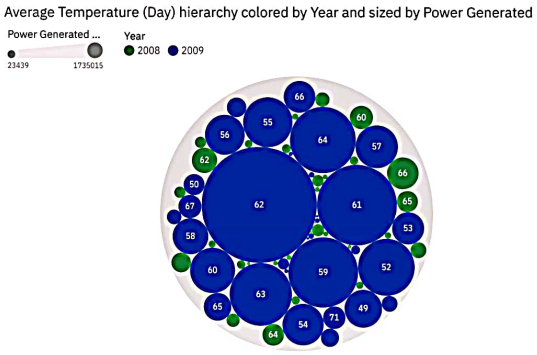
Relative Humidity by Power Generate

- Year 2009 has the highest values of both Power Generated and Average Wind Speed (Day).
- Add insight to favorites
- Power Generated has a fitted maximum value of 2,108,699 when Relative Humidity is 71.26.
- Add insight to favorites
- Month 4 has the highest Average Average Wind Speed (Day) but is ranked #4 in Total Power Generated.
- Add insight to favorites



Average Temperature by Power Generate

- Power Generated is unusually high when Average Temperature (Day) is 62.
- Add insight to favorites
- Average Temperature (Day) 45 has the highest Average Relative Humidity but is ranked #37 in Total Power Generated.
-



Index.html

```
<!DOCTYPE html>
<html lang="en">

<head>
<meta charset="utf-8">
<meta content="width=device-width, initial-scale=1.0" name="viewport">

<title>SOLAR PANEL FORECASTING</title>
<meta content="" name="description">
<meta content="" name="keywords">
<!-- Favicons -->
<link href="{{ url_for('static',filename='assets/img/favicon.png')}}" rel="icon">
<link href="{{ url_for('static',filename='assets/img/apple-touch-icon.png')}}"
rel="apple-touch-icon">

<!-- Google Fonts -->
<link
href="https://fonts.googleapis.com/css?family=Open+Sans:300,300i,400,400i,600,600i,700
,700i|Raleway:300,300i,400,400i,500,500i,600,600i,700,700i|Poppins:300,300i,400,400i,5
00,500i,600,600i,700,700i"
rel="stylesheet">

<!-- Vendor CSS Files -->
<link href="{{ url_for('static',filename='assets/vendor/aos/aos.css')}}"
rel="stylesheet">
<link href="{{
url_for('static',filename='assets/vendor/bootstrap/css/bootstrap.min.css')}}"
rel="stylesheet">
<link href="{{
url_for('static',filename='assets/vendor/bootstrap-icons/bootstrap-icons.css')}}"
rel="stylesheet">
<link href="{{
url_for('static',filename='assets/vendor/boxicons/css/boxicons.min.css')}}"
rel="stylesheet">
<link href="{{
url_for('static',filename='assets/vendor/glightbox/css/glightbox.min.css')}}"
rel="stylesheet">
<link href="{{ url_for('static',filename='assets/vendor/remixicon/remixicon.css')}}"
rel="stylesheet">
```

```
<link href="{{
url_for('static',filename='assets/vendor/swiper/swiper-bundle.min.css')}}"
rel="stylesheet">

<!-- Template Main CSS File -->
<link href="{{ url_for('static',filename='assets/css/style.css')}}" rel="stylesheet">

<!-- =======================================================
* Template Name: Gp
* Updated: Sep 18 2023 with Bootstrap v5.3.2
* Template URL:
https://bootstrapmade.com/gp-free-multipurpose-html-bootstrap-template/
* Author: BootstrapMade.com
* License: https://bootstrapmade.com/license/
======================================================= -->
</head>

<body>

<!-- ======= Header ======= -->
<header id="header" class="fixed-top ">
<div class="container d-flex align-items-center justify-content-lg-between">

<h1 class="logo me-auto me-lg-0"><a href="index.html">Solar Panel Forecast</a></h1>
<!-- Uncomment below if you prefer to use an image logo -->
<!-- <a href="index.html" class="logo me-auto me-lg-0"><img src="assets/img/logo.png"
alt="" class="img-fluid"></a>-->

<nav id="navbar" class="navbar order-last order-lg-0">
<ul>
<li><a class="nav-link scrollto active" href="#hero">Home</a></li>
<li><a class="nav-link scrollto" href="#about">Dashboard</a></li>
<li><a class="nav-link scrollto" href="#services">Story</a></li>
<li><a class="nav-link scrollto " href="#portfolio">Report</a></li>
<li><a class="nav-link scrollto" href="#team"></a></li>
<li class="dropdown"><a href="#"><span></span> <i class="bi bi-chevron-down"></i></a>
<ul>

</div>
</header><!-- End Header -->

<!-- ======= Hero Section ======= -->
```

```
<section id="hero" class="d-flex align-items-center justify-content-center">
<div class="container" data-aos="fade-up">

<div class="row justify-content-center" data-aos="fade-up" data-aos-delay="150">
<div class="col-xl-6 col-lg-8">
<h1>Solar Panel Forecasting</h1>
<h2>analysis using dashboard,story,report.</h2>
</div>
</div>

<div class="row gy-4 mt-5 justify-content-center" data-aos="zoom-in"
data-aos-delay="250">
<div class="col-xl-2 col-md-4">
<div class="icon-box">
<i class="ri-store-line"></i>
<h3><a href=""></a></h3>
</div>
</div>
<div class="col-xl-2 col-md-4">
<div class="icon-box">
<i class="ri-bar-chart-box-line"></i>
<h3><a href=""></a></h3>
</div>
</div>
<div class="col-xl-2 col-md-4">
<div class="icon-box">
<i class="ri-calendar-todo-line"></i>
<h3><a href=""></a></h3>
</div>
</div>
<div class="col-xl-2 col-md-4">
<div class="icon-box">
<i class="ri-paint-brush-line"></i>
<h3><a href=""></a></h3>
</div>
</div>
<div class="col-xl-2 col-md-4">
<div class="icon-box">
<i class="ri-database-2-line"></i>
<h3><a href=""></a></h3>
</div>
</div>
```

```
</div>

</div>
</section><!-- End Hero -->

<main id="main">

<!-- ======= About Section ======= -->
<section id="dashboard" class="dashboard">
<div class="container" data-aos="fade-up">
<div class="section-title">
<h1>Dashboard</h1>
<p>This is a congos dashboard on the data of Solar panel forecasting</p>
</div>

<div class="row">
<iframe
src="https://us3.ca.analytics.ibm.com/bi/?perspective=dashboard&amp;pathRef=.my_folder
s%2FSolar%2BDashboard&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar
=false&amp;shareMode=embedded&amp;action=view&amp;mode=dashboard"
width="820" height="800" frameborder="0" gesture="media" allow="encrypted-media"
allowfullscreen=""></iframe>
</section><!-- End About Section -->

<!-- ======= Clients Section ======= -->

</section><!-- End Clients Section -->

<!-- ======= Features Section ======= -->

</section><!-- End Features Section -->

<!-- ======= Services Section ======= -->
<section id="services" class="services">
<div class="container" data-aos="fade-up">

<div class="section-title">
<h1>Story</h1>
<p>The visual narrate on solar panel forecasting</p>
</div>

<div class="row">
```

```
<iframe
src="https://us3.ca.analytics.ibm.com/bi/?perspective=story&amp;pathRef=.my_folders%2F
Solar%2BStory&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&a
mp;shareMode=embedded&amp;action=view&amp;mode=dashboard"
width="920" height="800" frameborder="0" gesture="media" allow="encrypted-media"
allowfullscreen=""></iframe>
</section><!-- End Services Section -->

<!-- ======= Cta Section ======= -->

</section><!-- End Cta Section -->

<!-- ======= Portfolio Section ======= -->
<section id="portfolio" class="portfolio">
<div class="container" data-aos="fade-up">

<div class="section-title">
<h1>Report</h1>
<p>Here we create a report in solar panel forecasting with the help of
visualisations</p>
</div>

<div class="row" data-aos="fade-up" data-aos-delay="100">
<iframe
src="https://us3.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2FSolar%2BPanel%2BReport
&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=
embedded"
width="800" height="800" frameborder="0" gesture="media" allow="encrypted-media"
allowfullscreen=""></iframe>
</section><!-- End Portfolio Section -->

<!-- ======= Counts Section ======= -->




</section><!-- End Counts Section -->

<!-- ======= Testimonials Section ======= -->
```

```
<!-- ======= Team Section ======= -->




</section><!-- End Team Section -->

<!-- ======= Contact Section ======= -->



</section><!-- End Contact Section -->

</main><!-- End #main -->

<!-- ======= Footer ======= -->

</footer><!-- End Footer -->

<div id="preloader"></div>
<a href="#" class="back-to-top d-flex align-items-center justify-content-center"><i
class="bi bi-arrow-up-short"></i></a>

<!-- Vendor JS Files -->
<script src="{{
url_for('static',filename='assets/vendor/purecounter/purecounter_vanilla.js')}}"></scr
ipt>
<script src="{{ url_for('static',filename='assets/vendor/aos/aos.js')}}"></script>
<script src="{{
url_for('static',filename='assets/vendor/bootstrap/js/bootstrap.bundle.min.js')}}"></s
cript>
<script src="{{
url_for('static',filename='assets/vendor/glightbox/js/glightbox.min.js')}}"></script>
<script src="{{
url_for('static',filename='assets/vendor/isotope-layout/isotope.pkgd.min.js')}}"></scr
ipt>
<script src="{{
url_for('static',filename='assets/vendor/swiper/swiper-bundle.min.js')}}"></script>
<script src="{{
url_for('static',filename='assets/vendor/php-email-form/validate.js')}}"></script>
```

```
<!-- Template Main JS File -->
<script src="{{ url_for('static',filename='assets/js/main.js')}}"></script>

</body>

</html>
```

App.py

```
from flask import Flask, render_template, request


app = Flask(__name__) # initializng the flask app


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

if __name__ == '_main_':
app.debug = run
```