

SOLAR POWER GENERATION FORECASTING

Data analytics with tableau

TEAM ID: 9C05B58063F2C7CAA384F87D2AA8CF21

TEAM MEMBERS:

YUVASRI B

SARMILA A

ANUSIYA V

LIYASINI G

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

**MOUNT ZION COLLEGE OF ENGINEERING AND
TECHNOLOGY**

PUDUKKOTAI-622507

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CHAPTER 1

INTRODUCTION

1.1.PROJECT OVERVIEW

Solar panels are usually made from silicon installed in a metal panel frame with a glass casing. When photons, or particles of light, hit the thin layer of silicon on the top of a solar panel, they knock electrons off the silicon atoms.

This PV charge creates an electric current (specifically, direct current or DC), which is captured by the wiring in solar panels. This DC electricity is then converted to alternating current (AC) by an inverter. AC is the type of electrical current used when you plug appliances into normal wall sockets.

1.2.PURPOSE

Solar power works by converting energy from the sun into power. There are two forms of energy generated from the sun for our use – electricity and heat.

Solar power forecasting is the process of gathering and analyzing data in order to predict solar power generation on various time horizons. Solar power forecasts are used for efficient management of the electric grid and for power trading.

CHAPTER 2

IDEATION & PROPOSED SOLUTION

2.1. PROBLEM STATEMENT DEFINITION



Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	User	Converting solar energy into electricity	To block the sunlight	Covering the solar array with opaque sheet	Depressed
PS-2	User	Analyzing data for predict solar power generation	PV charge creates electric current	Which is captured by wiring solar panel	Sadness

2.2.EMPATHY MAP CANVAS



2.3. IDEATION & BRAINSTORMING

Template



Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

10 minutes to prepare
1 hour to collaborate
2-8 people recommended

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

10 minutes

Team gathering
Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

Set the goal
Think about the problem you'll be focusing on solving in the brainstorming session.

Learn how to use the facilitation tools
Use the Facilitation Superpowers to run a happy and productive session.

Open article

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

⌚ 20 minutes

TIP

Add customizable tags to sticky notes to make it easier to find, review, organize, and categorize important ideas as themes within your mind.

Overloaded
and emit
excess heat

Panels can
be damaged
due to severe
weather
conditions

Energy is
generated
only the sun
shines

Voltage
difference
occurs between
the earthing
and panel

Internal
corrosion
occurs due to
moisture seeps
in the panel

Microcrack
occur in solar
cells as a result
of PV modules
production

Habitat loss
occurs because
of using
hazardous
material

Contamination
occurred in the
panel only after
a few years of
production



Prioritize

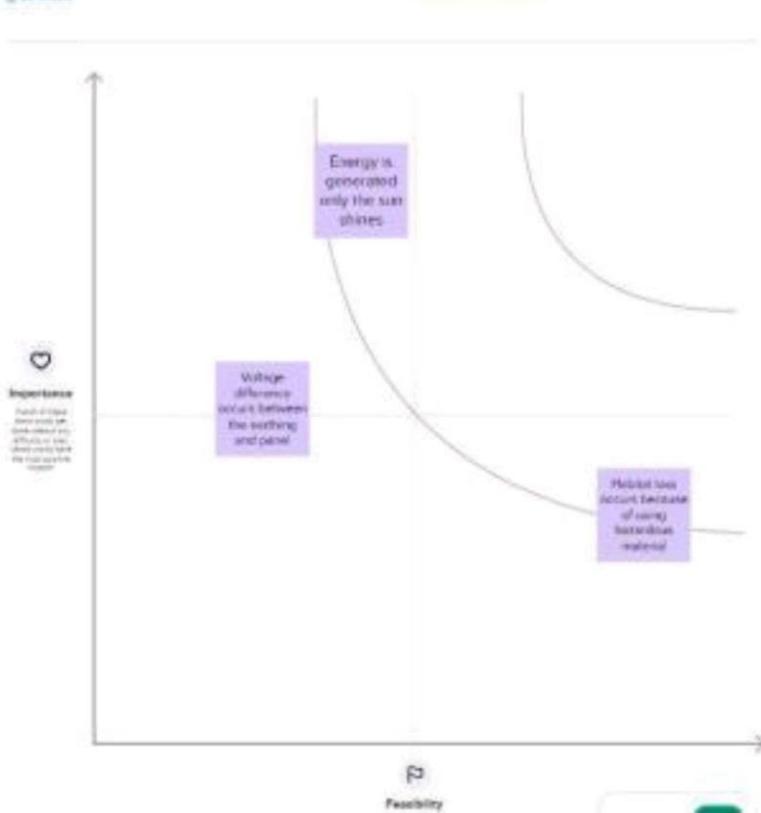
Your team should be on the same page about what's important moving forward. Place your tasks on this grid to determine which ideas are important and which are feasible.

15-30 minutes



TIP

Remember, you can move ideas to a different quadrant if you find they're more important than first thought. The facilitator can move ideas around too if they see a better place fitting the story you're telling.



After you collaborate

You can export the matrix as an image or PDF to share with members of your company via email, Slack, or Google Sheets.

Quick next steps:

Show the road map
Show a visualized overview of the project timeline and scope to align the outcomes of the session.

Brainstorm
Launch a series of brief 15-20 minute sessions to generate ideas or validate existing ones.

Keep moving forward:

Storage blueprint
Outline the components of a new idea or strategy.

[Open the template](#) →

Customer experience journey map
Outline how customers interact with your business and validate the experience.

[Open the template](#) →

Strategic opportunities & threats
Identify strengths, weaknesses, opportunities, and threats (SWOT) to identify focus.

[Open the template](#) →

Move toward feedback

2.4.PROPOSED SOLUTION

S.NO	PARAMETER	DESCRIPTIONS
1.	Problem Statement (Problem to be solved)	<p>Solar power forecasting is the process of gathering and analyzing data in order to predict solar power generation on various time horizons. Solar power forecasts are used for efficient management of the electric grid and for power trading.</p> <p>Solar panels are usually made from silicon installed in a metal panel frame with a glass casing. When photons, or particles of light, hit the thin layer of silicon on the top of a solar panel, they knock electrons off the silicon atoms.</p> <p>This PV charge creates an electric current, which is captured by the wiring in solar panels. This DC electricity is then converted to alternating current (AC) by an inverter. AC is the type of electrical current used when you plug appliances into normal wall sockets.</p> <p>The problem statement for a solar energy installation project is to develop a plan to efficiently and effectively install solar energy systems in target areas with a focus on reducing costs and increasing energy production.</p>

2	Idea/ Solution Description	<p>The Solar Forecasting funding program builds on the Improving Solar Forecasting Accuracy funding program to support projects that generate tools and knowledge to enable grid operators to better forecast how much solar energy will be added to the grid. These efforts will improve the management of solar power's variability and uncertainty, enabling its more reliable and cost-effective integration onto the grid. This funding program supports the Energy Department's broader Grid Modernization Initiative, a crosscutting effort that helps to better integrate all sources of electricity, improve the security of our nation's grid, solve challenges of energy storage and distributed generation.</p>
3	Novelty/ Uniqueness	<p>The main aim of solar PV forecasting is to forecast the weather conditions such as temperature, solar radiation and to that of PV output for a particular system. A standardized model is always helpful in predicting the performance of solar PV of different capacity under any environmental condition.</p>
4	Social Impact / Customer Satisfaction	<p>Satisfaction is an overall affective response to a perceived discrepancy between prior expectation and perceived performance after consumption. This study defines satisfaction as the sense of happiness formed by the beneficiaries through the previous expectation and actual perception. Some studies confirmed there was a close connection.</p>

5	Business Model (Revenue Model)	<p>Under this model, you supply, install, own and operate the solar power system located on the roof or property of your customer. Your customer agrees to purchase the electricity the system generates at a given rate over a certain period, typically 10 years or longer . This business model is attractive because the customer enjoys a guaranteed electricity rate without assuming any risk.</p>
6	Scalability of the Solution	<p>Solar power is also scalable. This means that it can be deployed on an industrial scale, or it can be used to power a single household.</p>

CHAPTER 3

REQUIREMENT ANALYSIS

3.1.FUNCTIONAL REQUIREMENTS

Following are the functional requirements of the proposed solution.

FR.NO	Functional Requirement	Sub Requirement
FR-1	Sun's Path	sunny days to snowstorms, climate and weather can play a significant role in the production and efficiency of a solar power installation.
FR-2	Atmospheric condition	Low clouds can block light from the sun, which means less solar energy. As the temperature rises, the panel generates less voltage and becomes less efficient, producing less electricity.
FR-3	Solar energy plant	Converts solar radiation, made up of light, heat, and ultraviolet radiation, into electricity suitable to be supplied to homes and industries.

3.2.NON FUNCTIONAL REQUIREMENTS

Following are the non-functional requirements of the proposed solution.

NFR.NO	Non-Functional Requirements	Description
--------	-----------------------------	-------------

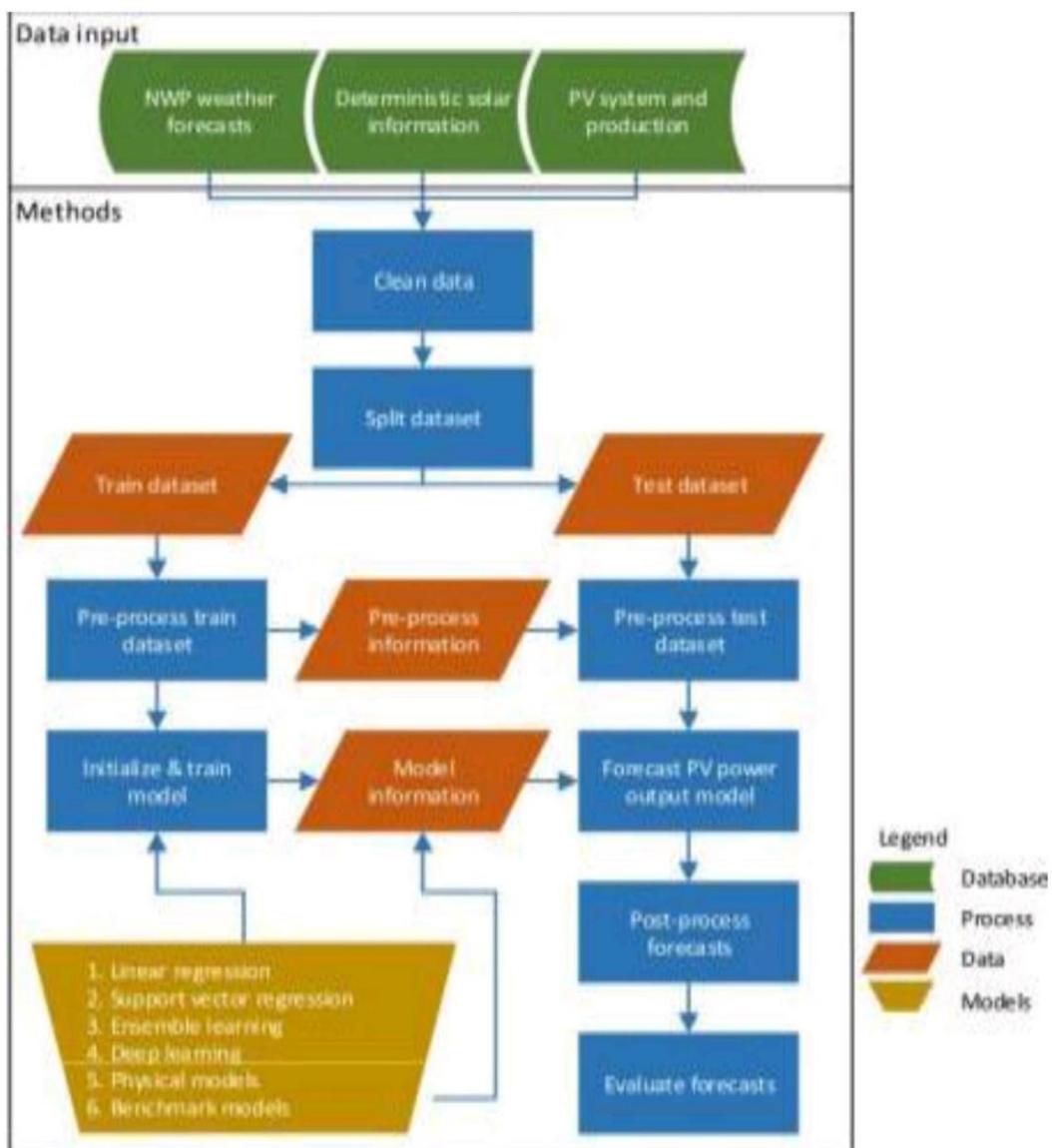
NFR-1	Usability	The efficiency of the photovoltaic (PV) cells that make up a solar panel is calculated on the basis of energy from sunlight that is converted into electricity by semiconductors. An efficient solar panel is one that generates more electricity by occupying less space. Manufacturers rate solar panels by their efficiency, which ranges from around 15% to 20% of conversion of the sun's energy transformed into usable electricity.
NFR-2	Security	When installed correctly, solar panels are very safe and pose a minimal fire risk. In fact, solar panels are less of a fire risk than common household appliances, such as the toaster, washing machine, dryer and dishwasher.
NFR-3	Reliability	Solar energy is a reliable and savvy long-term investment for homeowners. Photovoltaic panels and other components are durable and long-lasting with proper maintenance and monitoring. They can significantly reduce or even eliminate a homeowner's electricity bill. The failure rate of solar panels is exceptionally low.
NFR-4	Performance	In real life, a value of 100 % cannot be achieved, as unavoidable losses always arise with the operation of the PV plant (e.g. thermal loss due to heating of the PV modules). High-performance PV plants can however reach a performance ratio of up to 80 %. The key factors driving uncertainty such as look-ahead horizon, forecasting interval width, tracking systems and system size. By considering these factors in plant design and electric system design we can reduce uncertainty and thus lower the cost to integrate solar

		energy.
NFR-5	Availability	<p>Karnataka is one of the highest solar power producing states in India with a total 7,597 MW installed capacity by the end of June 2022. The scope of solar energy in India is vast, and the country has made significant strides in harnessing its solar energy potential. The Indian government has implemented several policies and initiatives to encourage the development and use of solar energy, and the country is making significant progress in the field of rooftop solar and solar power parks. With a target of achieving 175 GW of renewable energy capacity by 2022, including 100 GW from solar energy, India is well on its way to becoming a major player in the global solar energy market.</p>
NFR-6	Scalability	Solar power is also scalable. It can be deployed on an industrial scale, or it can be used to power a single household.

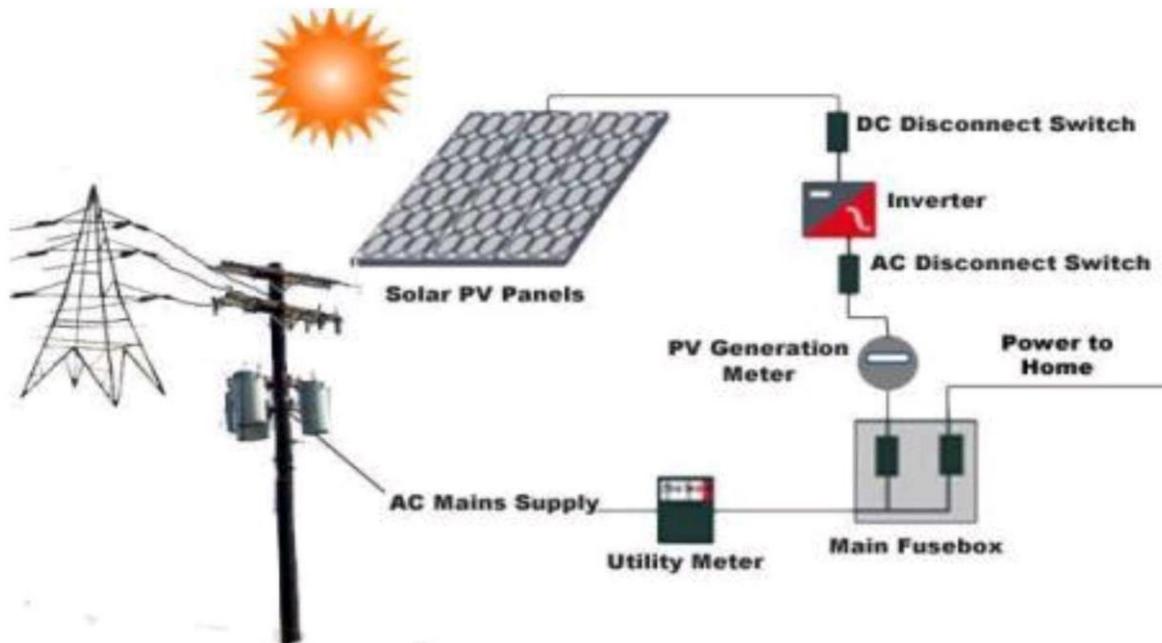
CHAPTER 4

PROJECT DESIGN

4.1. DATA FLOW DIAGRAMS



4.2.SOLUTION & TECHNICAL ARCHITECTURE



4.3.USER STORIES

User Type	Functional Requirement	User Story Number	User story/Task	Acceptance criteria	Priority	Team Member
Customer	Inverter	USN-1	As a user, I can use inverter sometimes there is a shutdown happens	If most of your appliances run on DC power, then you don't have a need for an inverter.	High	Yuvasri

Customer	Solar Panel	USN-2	As a user, I can buy panels with high concentrated photovoltaic cells or low concentrated cells.	There's also not as many models of CPV available as traditional PV. But, it's certainly worth considering CPV if you can find a supplier and have the money to spend upfront. Avoid installing solar panels in shaded areas	High	Sarmila
Customer Care Executive	Battery	USN-3	If there is any possibility to use it without battery storage	Yes, if you are connected to an electrical grid, you can use solar panels and inverters without battery storage.	Medium	Anusiya
Administrator	Control	USN-4	I can monitor the overall process of 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.	A solar project manager maximizes efficiency in the implementation of detailed project plans, keeping track of goals, tasks, resources, schedules, costs, and contingencies.	High	Liyasini

CHAPTER 5

CODING & SOLUTIONING

```
<!DOCTYPE html>

<html lang="en">

<head>

    <meta charset="utf-8">

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

    <title>HeroBiz Bootstrap Template - Home
    1</title> <meta content="" name="description">
    <meta content="" name="keywords">

    <!-- Favicons -->

    <link href="assets/img/favicon.png" rel="icon">

    <link href="assets/img/apple-touch-icon.png" rel="apple-touch-icon">

    <!-- Google Fonts -->

    <link rel="preconnect" href="https://fonts.googleapis.com">
    <link rel="preconnect" href="https://fonts.gstatic.com"
    crossorigin> <link

    href="https://fonts.googleapis.com/css2?family=Open+Sans:ital,wght@0,300;0,400;0,50
    0;0,600;0,700;1,300;1,400;1,500;1,600;1,700&family=Poppins:ital,wght@0,300;0,400;0,
    500;0,600;0,700;1,300;1,400;1,500;1,600;1,700&family=Source+Sans+Pro:ital,wght@0,
    300;0,400;0,600;0,700;1,300;1,400;1,600;1,700&display=swap" rel="stylesheet">

    <!-- Vendor CSS Files -->

    <link href="assets/vendor/bootstrap/css/bootstrap.min.css" rel="stylesheet">
    <link href="assets/vendor/bootstrap-icons/bootstrap-icons.css"
    rel="stylesheet"> <link href="assets/vendor/aos/aos.css" rel="stylesheet">

    <link href="assets/vendor/glightbox/css/glightbox.min.css" rel="stylesheet">
    <link href="assets/vendor/swiper/swiper-bundle.min.css" rel="stylesheet">

    <!-- Variables CSS Files. Uncomment your preferred color scheme -->
    <link href="assets/css/variables.css" rel="stylesheet">
    <!-- <link href="assets/css/variables-blue.css" rel="stylesheet"> -->
    <!-- <link href="assets/css/variables-green.css" rel="stylesheet"> -->
    <!-- <link href="assets/css/variables-orange.css" rel="stylesheet"> -->
```

```
<!-- <link href="assets/css/variables-purple.css" rel="stylesheet"> -->
<!-- <link href="assets/css/variables-red.css" rel="stylesheet"> -->
<!-- <link href="assets/css/variables-pink.css" rel="stylesheet"> -->

<!-- Template Main CSS File -->

<link href="assets/css/main.css" rel="stylesheet">

<!-- ===== -->
* Template Name: HeroBiz

* Updated: Mar 10 2023 with Bootstrap v5.2.3

* Template URL: https://bootstrapmade.com/herobiz-bootstrap-business-template/

* Author: BootstrapMade.com

* License: https://bootstrapmade.com/license/




===== -->

</head>

<body>

<!-- ===== Header ===== -->

<header id="header" class="header fixed-top" data-scrollto-offset="0">

<div class="container-fluid d-flex align-items-center justify-content-between">

<a href="index.html" class="logo d-flex align-items-center scrollto me-auto me-lg-0"> <!-- Uncomment the line below if you also wish to use an image logo -->
<!--  --
> <h1>HeroBiz<span>.</span></h1>

</a>

<nav id="navbar" class="navbar">

<ul>

<li class="dropdown"><a href="#"><span>Home</span> <i class="bi bi-chevron-down dropdown-indicator"></i></a>
</li>

<li><a class="nav-link scrollto" href="index.html#about">About</a></li>
<li><a class="nav-link scrollto" href="index.html#services">Dashboard</a></li>
<li><a class="nav-link scrollto" href="index.html#portfolio">Story</a></li>
<li><a class="nav-link scrollto" href="index.html#team">Report</a></li> </li>


```

```
<li><a class="nav-link scrollto" href="index.html#contact">Contact</a></li> </ul>

<i class="bi bi-list mobile-nav-toggle d-none"></i>
</nav><!-- .navbar -->

<a class="btn-getstarted scrollto" href="index.html#about">Get Started</a>
</div>

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

<section id="hero-animated" class="hero-animated d-flex align-items-center">
  <div class="container d-flex flex-column justify-content-center align-items-center text-center position-relative" data-aos="zoom-out">
    
    <h2>Welcome to <span>Solar Panel Forecasting</span></h2>

    <p>Et voluptate esse accusantium accusamus natus reiciendis quidem voluptates similique aut.</p>
    <div class="d-flex">

      <a href="#about" class="btn-get-started scrollto">Get Started</a>

      <a href="https://www.youtube.com/watch?v=LXb3EKWsInQ" class="glightbox btn-watch-video d-flex align-items-center"><i class="bi bi-play-circle"></i><span>Watch Video</span></a>
    </div>

  </div>
</section>

<main id="main">

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

      <div class="section-header">
        <h2>Dashboard</h2>
      </div>

      <div class="row gy-5">
```

```
src="https://us3.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2Fsolar-dashboard2&closeWindowOnLastView=true&ui_appbar=false&ui-navbar=false&shareMode=embedded&action=view&mode=dash board&subView=model000001883c854b2f_00000000" width="1250" height="800" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

</div>
</div>
</section><!-- End Services Section -->

</section><!-- End F.A.Q Section -->
<!-- ===== Portfolio Section ===== -->
<section id="portfolio" class="portfolio" data-aos="fade-up">
<div class="container">
<div class="section-header">
<h2>Story</h2>
</div>
</div>
<div class="row gy-5"></div>
<iframe
src="https://us3.ca.analytics.ibm.com/bi/?perspective=story&pathRef=.my_folders%2Fsolar-story&closeWindowOnLastView=true&ui_appbar=false&ui_na vbar=false&shareMode=embedded&action=view&sceneld=model00000 1883cb13174_00000002&sceneTime=0" width="1250" height="800" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>
```

```
</div>

</div>

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

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

<section id="team" class="team">

<div class="container" data-aos="fade-up">

<div class="section-header">

<h2>Report</h2>

</div>

<div class="row gy-5">

<iframe

src="https://us3.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2Fsolar-report&clo  
seWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=run&format=HTML&prompt=false" width="1250"  
height="800" frameborder="0" gesture="media" allow="encrypted-media"  
allowfullscreen=""></iframe>

</div>

</div>

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

<!-- ===== Recent Blog Posts Section ===== -->

<section id="recent-blog-posts" class="recent-blog-posts">

<div class="container" data-aos="fade-up">

<div class="section-header">

<h2>Blog</h2>

<p>Recent posts from our Blog</p>

</div>

<div class="row">
```

```
<div class="col-lg-4" data-aos="fade-up" data-aos-delay="200">
  <div class="post-box">
    <div class="post-img"></div>

    <div class="meta">
      <span class="post-date">Tue, December 12</span>
      <span class="post-author"> / Julia Parker</span>
    </div>

    <h3 class="post-title">Eum ad dolor et. Autem aut fugiat debitis
    voluptatem consequuntur sit</h3>
    <p>Illum voluptas ab enim placeat. Adipisci enim velit nulla. Vel omnis
    laudantium. Asperiores eum ipsa est officiis. Modi cupiditate exercitationem qui magni
    est...</p>
    <a href="blog-details.html" class="readmore stretched-
    link"><span>Read More</span><i class="bi bi-arrow-right"></i></a>
  </div>
</div>

<div class="col-lg-4" data-aos="fade-up" data-aos-delay="400">
  <div class="post-box">
    <div class="post-img"></div>

    <div class="meta">
      <span class="post-date">Fri, September 05</span>
      <span class="post-author"> / Mario Douglas</span>
    </div>

    <h3 class="post-title">Et repellendus molestiae qui est sed omnis voluptates
    magnam</h3>
    <p>Voluptatem nesciunt omnis libero autem tempora enim ut ipsam id. Odit
    quia ab eum assumenda. Quisquam omnis aliquid necessitatibus tempora
    consectetur doloribus...</p>
    <a href="blog-details.html" class="readmore stretched-
    link"><span>Read More</span><i class="bi bi-arrow-right"></i></a>
  </div>
</div>
```

```
<div class="col-lg-4" data-aos="fade-up" data-aos-delay="600">
<div class="post-box">
    <div class="post-img"></div>
```

```
<div class="meta">  
    <span class="post-date">Tue, July 27</span>  
    <span class="post-author"> / Lisa Hunter</span>  
</div>  
  
<h3 class="post-title">Quia assumenda est et veritatis aut quae</h3>  
<p>Quia nam eaque omnis explicabo similique eum quaerat similique  
laboriosam. Quis omnis repellat sed quae consectetur magnam veritatis dicta  
nihil...</p>  
    <a href="blog-details.html" class="readmore stretched-link"><span>Read More</span><i class="bi bi-arrow-right"></i></a>  
</div>  
  
</div>  
</div>  
</div>  
</div>  
</div>  
</div>  
</div>  
</div>  
</div>  
</div>  
</div>  
</div>  
<!-- End Recent Blog Posts Section -->  
  
<!-- ===== Contact Section ===== -->  
  
<section id="contact" class="contact">  
    <div class="container">  
        <div class="section-header">  
            <h2>Contact Us</h2>  
            <p>Ea vitae aspernatur deserunt voluptatem impedit deserunt magnam  
occaecati dssumenda quas ut ad dolores adipisci aliquam.</p>  
        </div>  
    </div>  
  
<div class="map">  
    <iframe  
        src="https://www.google.com/maps/embed?pb=!1m14!1m8!1m3!1d12097.43321346094  
3!2d-74.0062269!3d40.7101282!3m2!1i1024!2i768!4f13.1!3m3!1m2!1s0x0%3A0xb89d1  
fe6bc499443!2sDowntown+Conference+Center!5e0!3m2!1smk!2sbg!4v1539943755621  
" frameborder="0" allowfullscreen></iframe>  
</div><!-- End Google Maps -->
```

```
<div class="row gy-5 gx-lg-5">
  <div class="col-lg-4">
    <div class="info">
      <h3>Get in touch</h3>
      <p>Et id eius voluptates atque nihil voluptatem enim in tempore minima sit ad mollitia commodi minus.</p>
      <div class="info-item d-flex">
        <i class="bi bi-geo-alt flex-shrink-0"></i>
        <div>
          <h4>Location:</h4>
          <p>A108 Adam Street, New York, NY  
535022</p> </div>
        </div><!-- End Info Item -->
      <div class="info-item d-flex">
        <i class="bi bi-envelope flex-shrink-0"></i>
        <div>
          <h4>Email:</h4>
          <p>info@example.com</p>
        </div>
      </div><!-- End Info Item -->
      <div class="info-item d-flex">
        <i class="bi bi-phone flex-shrink-0"></i>
        <div>
          <h4>Call:</h4>
          <p>+1 5589 55488 55</p>
        </div>
      </div><!-- End Info Item -->
    </div>
  </div>
```

```
</div>  
<div class="col-lg-8">  
    <form action="forms/contact.php" method="post" role="form"
```

```
class="php-email-form">

    <div class="row">

        <div class="col-md-6 form-group">
            <input type="text" name="name" class="form-control" id="name" placeholder="Your Name" required>
        </div>

        <div class="col-md-6 form-group mt-3 mt-md-0">
            <input type="email" class="form-control" name="email" id="email" placeholder="Your Email" required>
        </div>

    </div>

    <div class="form-group mt-3">
        <input type="text" class="form-control" name="subject" id="subject" placeholder="Subject" required>
    </div>

    <div class="form-group mt-3">
        <textarea class="form-control" name="message" placeholder="Message" required></textarea>
    </div>

    <div class="my-3">
        <div class="loading">Loading</div>
        <div class="error-message"></div>
        <div class="sent-message">Your message has been sent. Thank you!</div>
    </div>
    <div class="text-center"><button type="submit">Send Message</button></div>
</form>
</div><!-- End Contact Form -->
</div>
</div>

</section><!-- End Contact Section -->
</main><!-- End #main -->
<!-- ===== Footer ===== -->
```

```
<footer id="footer" class="footer">  
  <div class="footer-content">  
    <div class="container">
```

```
<div class="row">

<div class="col-lg-3 col-md-6">
    <div class="footer-info">
        <h3>HeroBiz</h3>
        <p>
            A108 Adam Street <br>
            NY 535022, USA<br><br>
            <strong>Phone:</strong> +1 5589 55488 55<br>
            <strong>Email:</strong> info@example.com<br>
        </p>
    </div>
</div>

<div class="col-lg-2 col-md-6 footer-links">
    <h4>Useful Links</h4>
    <ul>
        <li><i class="bi bi-chevron-right"></i> <a href="#">Home</a></li>
        <li><i class="bi bi-chevron-right"></i> <a href="#">About us</a></li>
        <li><i class="bi bi-chevron-right"></i> <a href="#">Services</a></li>
        <li><i class="bi bi-chevron-right"></i> <a href="#">Terms of service</a></li>
        <li><i class="bi bi-chevron-right"></i> <a href="#">Privacy policy</a></li>
    </ul>
</div>

<div class="col-lg-3 col-md-6 footer-links">
    <h4>Our Services</h4>
    <ul>
        <li><i class="bi bi-chevron-right"></i> <a href="#">Web Design</a></li> <li><i class="bi bi-chevron-right"></i> <a href="#">Web Development</a></li>
        <li><i class="bi bi-chevron-right"></i> <a href="#">Product Management</a></li>
    </ul>
</div>
```

```
<li><i class="bi bi-chevron-right"></i> <a href="#">Marketing</a></li>
<li><i class="bi bi-chevron-right"></i> <a href="#">Graphic Design</a></li>
</ul>

</div>

<div class="col-lg-4 col-md-6 footer-newsletter"> <h4>Our Newsletter</h4>

<p>Tamen quem nulla quae legam multos aute sint culpa legam noster
```

magna</p>

```
<form action="" method="post">
    <input type="email" name="email"><input type="submit" value="Subscribe"> </form>
</div>
</div>
</div>
</div>

<div class="footer-legal text-center">
    <div class="container d-flex flex-column flex-lg-row justify-content-center justify-content-lg-between align-items-center">
        <div class="d-flex flex-column align-items-center align-items-lg-start">
            <div class="copyright">
                &copy; Copyright <strong><span>HeroBiz</span></strong>. All Rights Reserved
            </div>
            <div class="credits">
                <!-- All the links in the footer should remain intact. -->
                <!-- You can delete the links only if you purchased the pro version. -->
                > <!-- Licensing information: https://bootstrapmade.com/license/ -->
                <!-- Purchase the pro version with working PHP/AJAX contact form: https://bootstrapmade.com/herobiz-bootstrap-business-template/ -->
                Designed by <a href="https://bootstrapmade.com/">BootstrapMade</a>
            </div>
        </div>
        <div class="social-links order-first order-lg-last mb-3 mb-lg-0">
            <a href="#" class="twitter"><i class="bi bi-twitter"></i></a>
            <a href="#" class="facebook"><i class="bi bi-facebook"></i></a>
            <a href="#" class="instagram"><i class="bi bi-instagram"></i></a>
            <a href="#" class="google-plus"><i class="bi bi-skype"></i></a>
            <a href="#" class="linkedin"><i class="bi bi-linkedin"></i></a>
        </div>
    </div>
```

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

<a href="#" class="scroll-top d-flex align-items-center justify-content-center"><i class="bi bi-arrow-up-short"></i></a>

<div id="preloader"></div>

<!-- Vendor JS Files -->

<script src="assets/vendor/bootstrap/js/bootstrap.bundle.min.js"></script>
<script src="assets/vendor/aos/aos.js"></script>

<script src="assets/vendor/glightbox/js/glightbox.min.js"></script> <script
src="assets/vendor/isotope-layout/isotope.pkgd.min.js"></script> <script
src="assets/vendor/swiper/swiper-bundle.min.js"></script> <script
src="assets/vendor/php-email-form/validate.js"></script>

<!-- Template Main JS File -->

<script src="assets/js/main.js"></script>

</body>

</html>
```

CHAPTER 6

RESULTS

6.1.PERFORMANCE METRICS

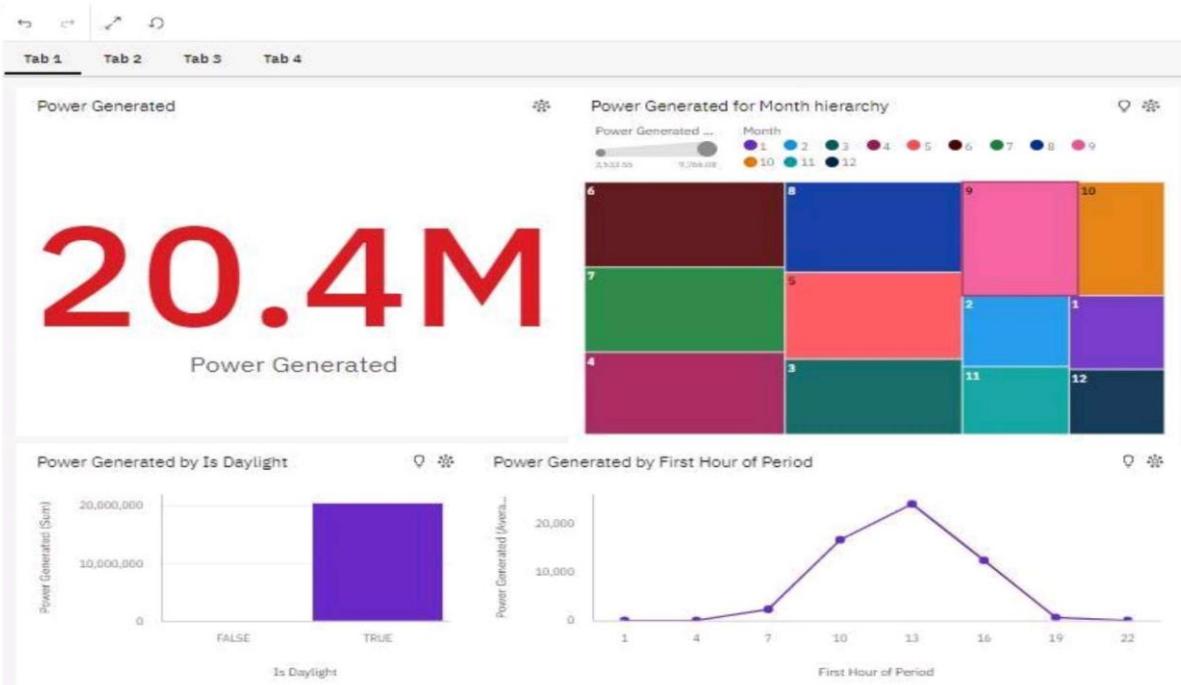
Home ▾ About Dashboard Story Report Contact

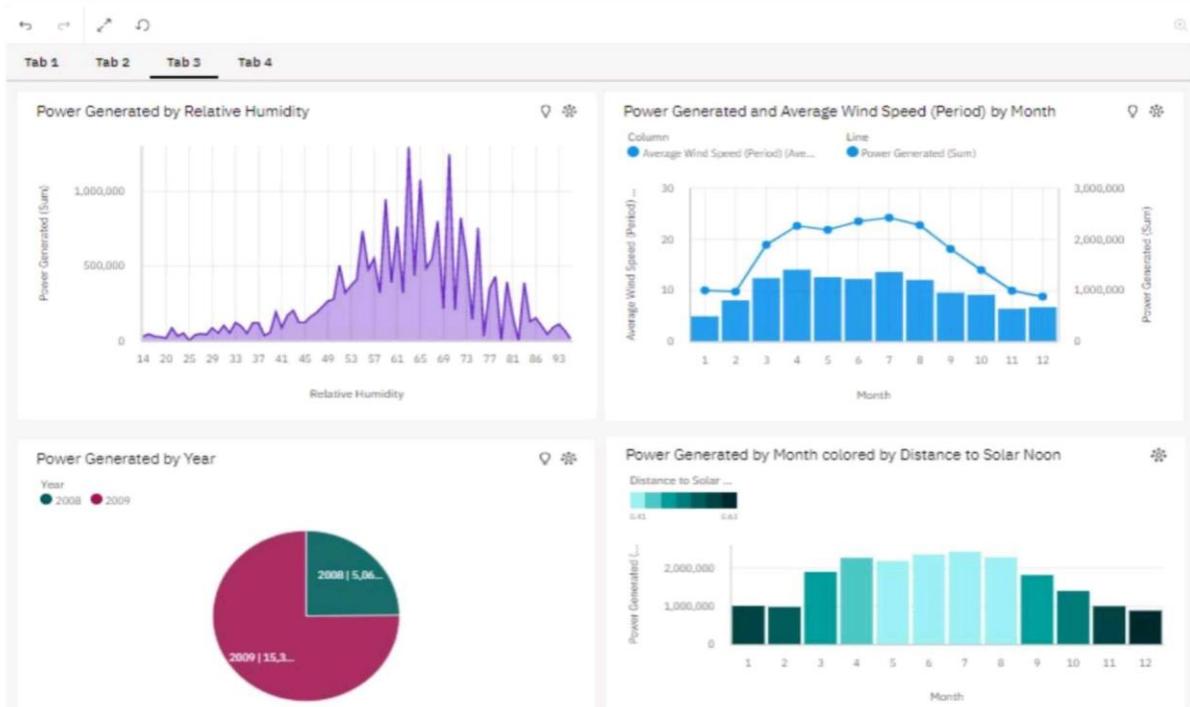
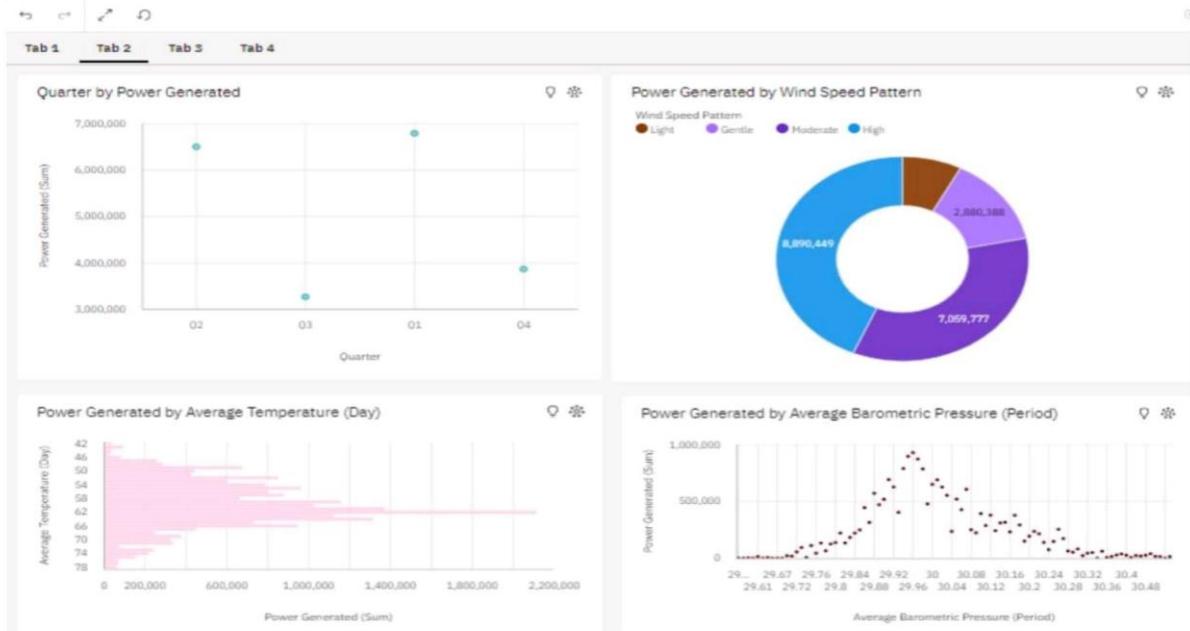


Welcome to Solar Panel Forecasting

DASHBOARD

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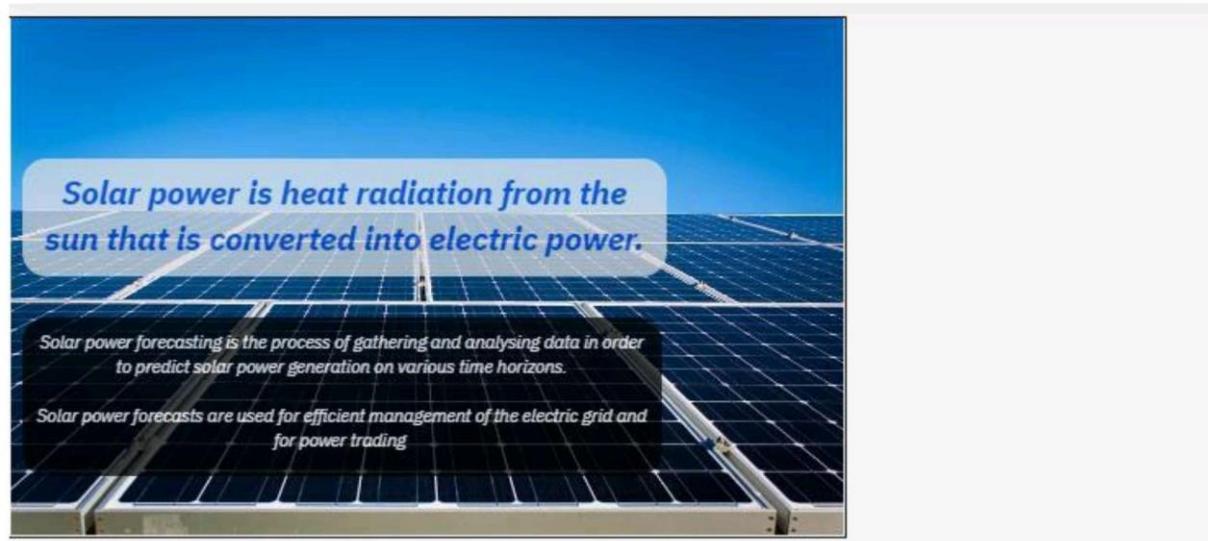




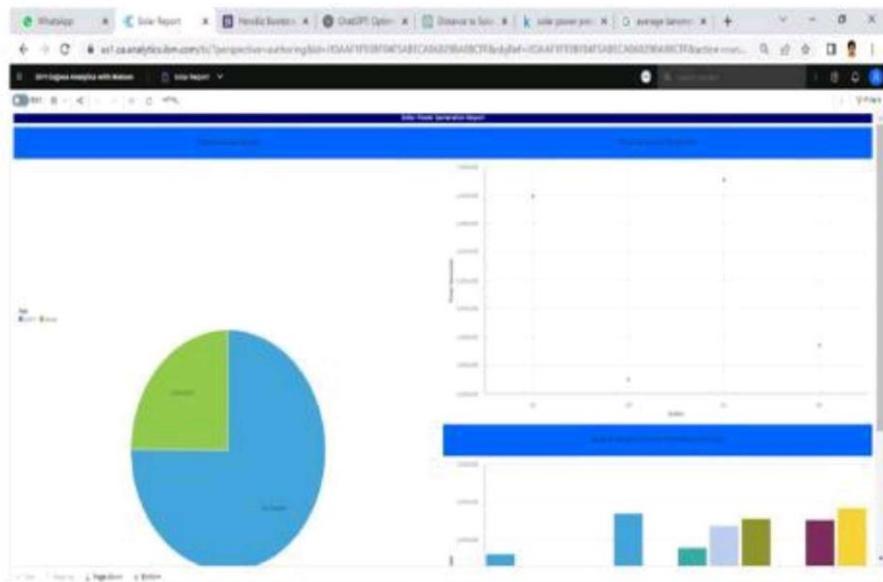
STORY

HeroBiz.

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REPORT



CHAPTER 7

ADVANTAGES & DISADVANTAGES

Advantages of solar panel forecasting

- Solar energy is clean & green energy
- Not dependent on other sources of Energy
- Non-maintenance
- Safer than Other
- Renewable Energy
- Electricity Bill Reduction
- Maximum Usage
- Technology Development

Disadvantages of solar panel forecasting

- Needs lots of space as efficiency is not 100% yet
- No solar power at night so there is a need for a large battery bank
- Devices that run on DC power directly are more expensive
- Depending on geographical location the size of the solar panels vary for the same power generation
- Cloudy days do not produce as much energy

CHAPTER 8

CONCLUSION

Nowadays, the most used method is the hybrid method which incorporates two or more techniques and produces a new forecasting method with improved accuracy. In this method the deficiencies of the individual model are overcome and advantages of individual models are utilized. These methods also reduce the forecast errors. For evaluating the forecast errors solar forecasting evaluation metrics are also studied. Forecasting evaluation metrics allow one to understand how much to trust the forecast and re-evaluate it in case of high errors.

CHAPTER 9

FUTURE SCOPE

Solar energy has been gaining a lot of attention in recent years as a reliable and sustainable source of energy. With increasing concerns about climate change and the need for clean energy, many countries are turning to solar energy as a solution. India is no exception, as the country has a vast potential for solar energy and has been making significant strides in harnessing this potential.

India has enormous potential for solar energy. The country receives an average of 300 sunny days per year, making it an ideal location for solar energy production. According to the National Institute of Solar Energy, India has the potential to generate up to 750 GW of solar energy, which is more than enough to meet the country's energy needs. Additionally, India has a large area of land that is suitable for solar power plants, with the states of Rajasthan, Gujarat, and Tamil Nadu being particularly well-suited for solar energy production.

CHAPTER 10

APPENDIX

GitHub & Project Demo Link:

GitHub link: <https://github.com/yuvashri-baskaran/Solar-Power-Generation>

Project demo link: <https://drive.google.com/file/d/120fyF4-DC939XcD-lyLolsYsAw1e42Ra/view?usp=drivesdk>