Smart Internz

Solar Panel Forecasting

Short Term Internship

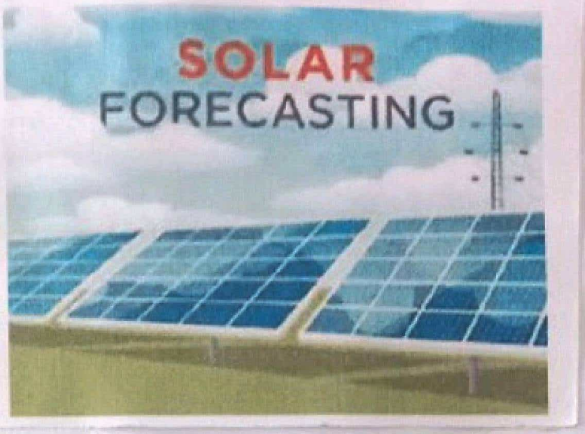
Project report

Team Members :

Boni jaswitha
Bavaraju shyam
Boni murali
Bommala sai dakshitha
Botta saritha

SOLAR PANEL FORECASTING

INTRODUCTION :-

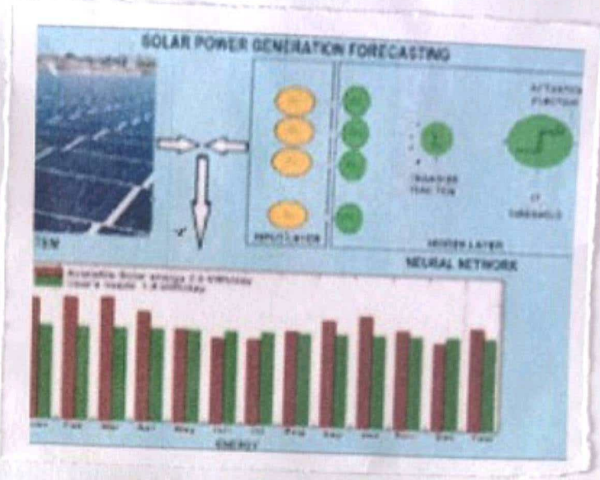


During our Short-term internship with Smart bridge, we've delved into the world of data analytics, with a primary focus on Solar Panel forecasting.

In this introductory section, we'll provide an overview of the importance of data visualization in conveying insights and our objective to create informative visualizations, including dashboards, reports, and data stories.

Solar Panel forecasting is a method used to predict the amount of electricity that Solar Panels will generate in the future based on various factors such as weather conditions, Sun Position and System Characteristics.

OVERVIEW :-



During our Short-term internship with Smart bridge, we've delved into the world of data analytics, with a Primary focus on Solar Panel forecasting.

In this we'll Provide an overview of the importance of data visualization in conveying insights and our objective to create informative visualizations, including dashboards, reports and data stories.

To ensure that our audience comprehends the intricate data we've been working with we've gone beyond merely generating these visualizations. we've taken the crucial step of Providing in-depth explanation for each one using Paragraphs this approach not only facilities an easier understanding of the data but also empowers our audience to drlaw actionable insights.

PURPOSE:-

This analytical process has culminated in the creation of a comprehensive document file that encapsulates our findings and recommendations.

Solar power forecasting is the 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. Solar Power forecasts are used for efficient management of the electric grid and for Power trading.

Solar Panel forecasting serves the purpose of predicting how much solar energy a photo voltaic (Pv) system will generate in the near future. this helps optimize energy management, grid integration, and resource planning by anticipating energy availability and demand, enabling efficient use of Solar Power and facilitating a smooth integration of renewable energy into the grid.

LITERATURE SURVEY:-

Before delving into our own work, it's 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 expected context of Solar energy Predictions.

EXISTING PROBLEM:-

Intermittency one of the biggest Problems that Solar energy technology Poses is that energy is only generated while the Sun is Shining. that means nighttime and overcast days can interrupt the supply.

without accurate weather prediction, it is impossible for a renewable generator to submit accurate Schedules.

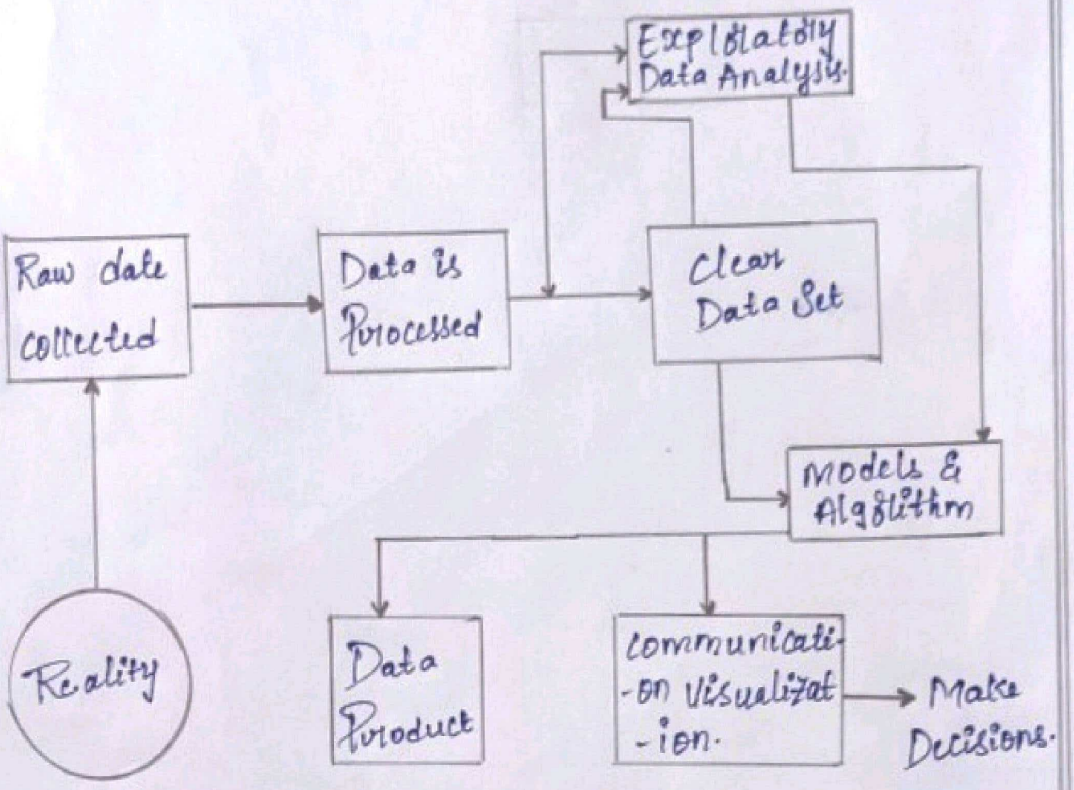
PROPOSED SOLUTION:-

The LSTM with dropout based DL model is Proposed to Predict the futuristic value of solar energy generation in different time-horizon (hourly and day basis), where the statistical wr based features combined with several other meterological factors such as temperature, wind, Speed, Pressure, cloudy-index, humidity etc....,

THEORITICAL ANALYSIS:-

In this Section, We'll transition from the literature Survey to our own theoretical analysis we'll delve into the Principles, models, and methodologies we've employed to forecast Solar Panel Performance. this is where we outline the concepts and theories that under Pin our work, including the factors considered in Solar energy Prediction.

BLOCK DIAGRAM:-



HARDWARE / SOFTWARE DESIGNING:-

HARDWARE:-

Solar hardware covers a wide range of technology, from individual components of a solar panel or concentrating solar power plant, to inverters that allows solar panels to feed energy back into the electricity grid, to the racking structures found on rooftops and untility-scale solar installations.

the manufacturing and competitiveness team works with awardees to determine the best applications for the specific hardware, develop it from a concept into a prototype, test its ability to function in real-world settings, and create a path to the market so the hardware can play a critical role in reducing the cost of solar-generated electricity.

SOFTWARE :-

Photovoltaic [PV] Software is a design tool that assists Solar development, construction and enginering companies to plain their plan Pv Projects for optimal energy efficiency, from the design phase through to construction and operation.

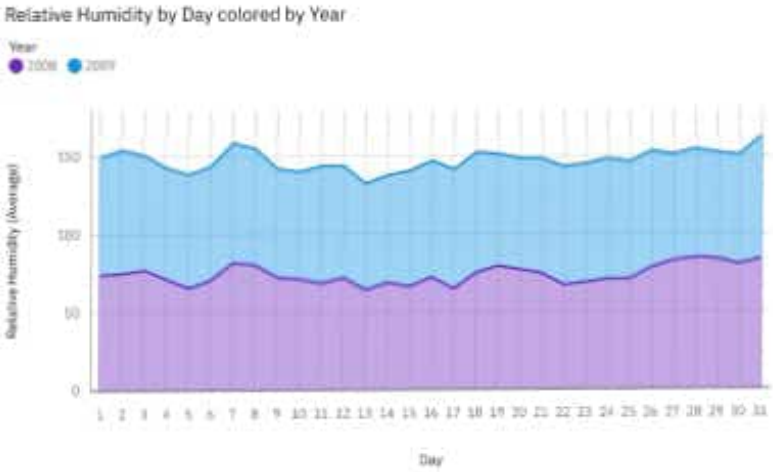
Helioscope is a top choice for commerci-cal Solar companies. the platform includes all the features you need to design complex Solar Systems in as little time as possible, impoinat improving the Roi of your projects. Helioscope also offers custom Pricing Packages to fit any Situation.


Power Generated by Year
Year
2008
2009
Average Barometric Pressure (Period)
87.7K
Average Barometric Pressure (Period)
Power Generated for Month
6
9,766.08
8
9,151.06
9
7,518....
10
5,6...
7
9,732.62
5
8,783.27
2
4,338.8
1
4,02...
4
9,395.27
3
7,610.46
11
4,126...
12
3,53...
Power Generated by Windspeed Pattern and Relative Humidity
Gentle |...
Gentle |...
Gentle |...
Gentle |...
Gentle |...
High | 36
High | 54
High | 70
High | 90
Light | 48
Light | 65
Light | 82
Moderat...
Moderat...
Moderat...
Moderat...
Power Generated by Average Wind Speed (Period)
10 ...
6
10
15
20
24
29
33
40
3
8
13
17
22
26
31
38


Solar Panel Forecasting
SOLAR
FORECASTING

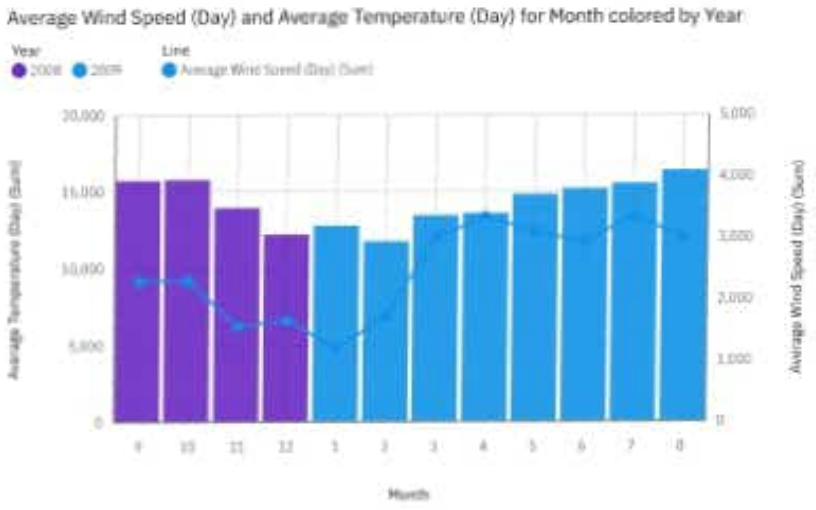
Relative Humidity by Day

- Over all days and years, the average of Relative Humidity is 73.51.
- The average values of Relative Humidity range from 64.09 to 84.5.
- Relative Humidity is most unusual when the combinations of Day and Year are 28 and 2008, 29 and 2008, 13 and 2008, 27 and 2008 and 17 and 2008.
- Relative Humidity is most unusual when Day is 13, 31 and 7.



Average Wind Speed and Temperature colored by Year

- Overall months and years the sum of Average Temperature (Day) is 171 thousand.
- Average Wind Speed (Day) ranges from over a thousand, when Month is 1, to almost 3500, when Month is 7.
- Average Wind Speed (Day) is unusually low when Month is 1.



Average Wind Direction(Day) compared to Relative Humidity

- The overall number of results for Average Wind Direction (Day) is nearly three thousand.
- The overall number of results for Day is nearly three thousand.
- The average of Relative Humidity is 73.51.

Average Wind Direction (Day) compared to Relative Humidity for Day

73.51 ↑

Relative Humidity

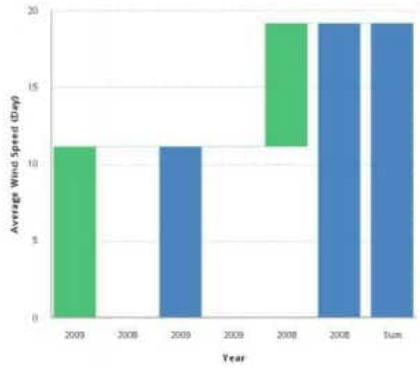
35 (+110.04%)

Average Wind Direction (Day)

Report

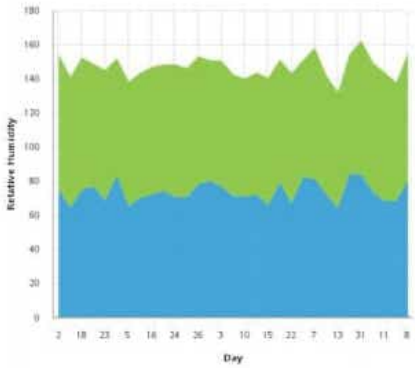
Column values

Increase Decrease Sum



Year

2008 2009



Month - Year

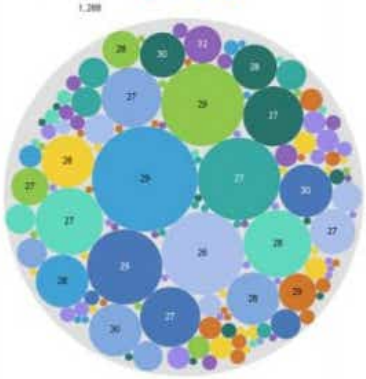
2 | 2009 5 | 2009 6 | 2008 10 | 2008 12 | 2008 7 | 2009 9 | 2008
11 | 2008 1 | 2009 3 | 2009 4 | 2009 8 | 2009

First Hour of Period

92 1,288

Month

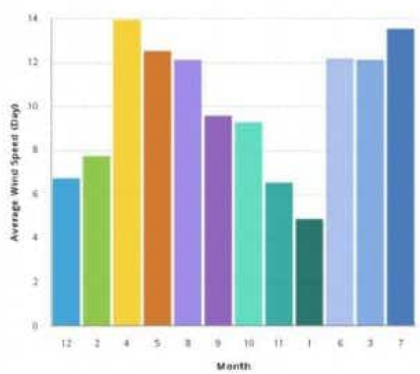
9 10 11 12 1 2 3 4
5 6 7 8



Report

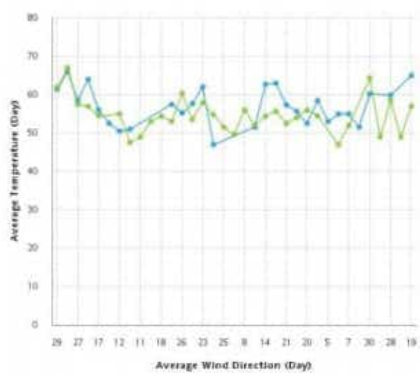
Month

12 2 4 5 8 9 10 11 1 6 3 7



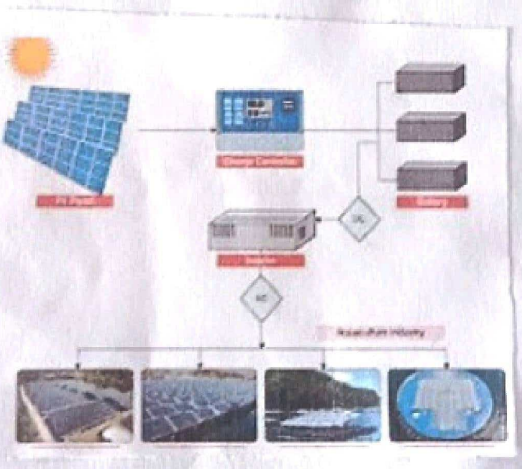
Year

2008 2009

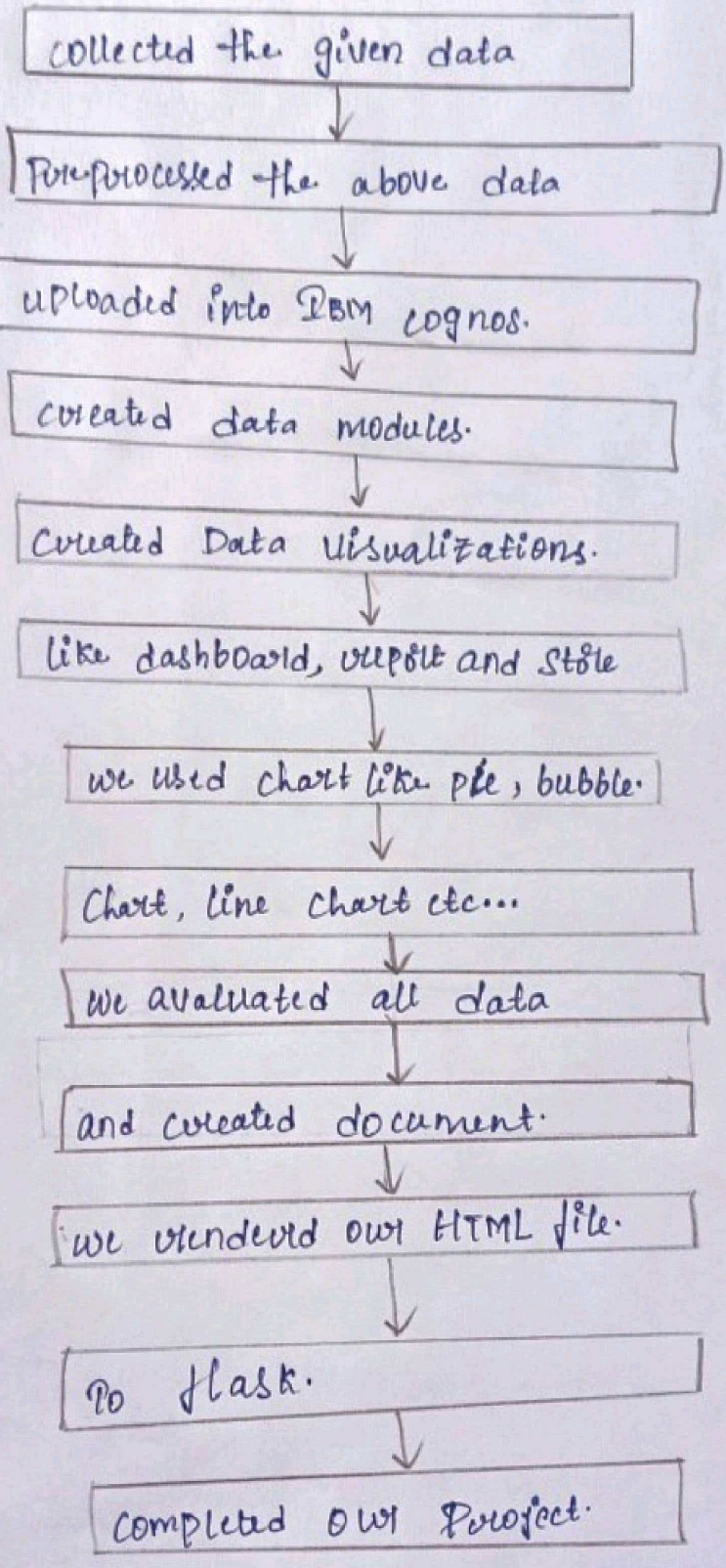


EXPERIMENTAL INVESTIGATIONS:-

The heart of our Project lies in the experimental investigations we've conducted. We've carefully examined the Provided dataset and harnessed Various data visualization techniques, including Pie Chart, bubble Charts, Waterfall Charts, and line charts. this Section will detail our Practical approach, the data analysis Process, and the insights we've extracted. Additionally, we'll describe how these Visualizations aid in identifying trends, Patterns, and opportunities for optimizing Solar Panel Performance.

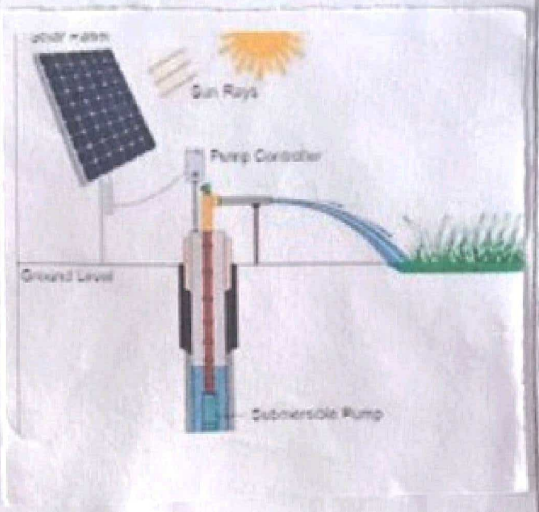


FLOW CHART:-


collected the given data
Pre-processed the above data
uploaded into IBM cognos.
created data modules.
Created Data Visualizations.
like dashboard, report and Stole
we used chart like pie, bubble.
Chart, line chart etc...
we avaluated all data
and created document.
we rendered our HTML file.
To flask.
completed our Project.

ADVANTAGES & DISADVANTAGES:-

ADVANTAGES:-



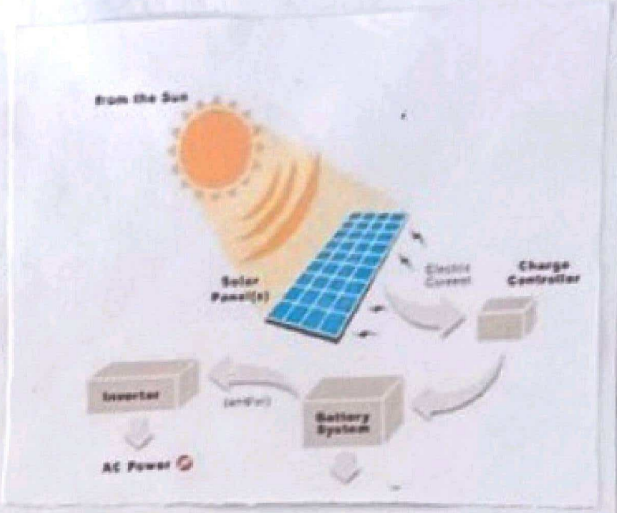
→ This is the biggest Plus to Solar Power.

* The Sun has been heating up the earth for a good 4.8 billion years and it is set to carry on for another 5 billion years.

→ Every inch of the world that is exposed to the Sun is receiving energy that can be converted into electricity.

* A recent study looked at the amount of sunlight the Sahara desert receives and for a way of highlighting the power available, worked out that we could generate enough energy to power the entire world by just covering 1.2 % of the desert in Solar Panels.

DISADVANTAGE:-



→ However, it is cheaper now as it has ever been for the equipment, with Prices dropping by over 80% in the last decade.

* It has to be said that shelling out 7-20 thousand pounds on a solar energy system is quite the outlay.

→ Installing items on your roof, where 90% of domestic Panels are situated, is always going to be something we leave to the Professional.

→ that means Scaffolding Safety and planning.

* Technology is moving so fast that you're getting more for your money too.

→ Panels are more efficient, inverters quicker and batteries more reliable.

APPLICATIONS:-

→ Our work extends beyond the theoretical realm, as we aim to apply our findings in practical Scenarios.

* Solar photovoltaics for electricity, Passive Solar design for Space heating and cooling and Solar water heating.

→ Solar Panels can be used to generate large amounts of electricity, and this process can taken place both at Solar and industrial Scales.

* Our work extends beyond the theoretical realm, as we aim to apply our findings in practical Scenarios.

→ Solar Panel forecasting, including how our data analytics and visualizations can be used in energy management, Solar Panel installation Planning, and Sub-Sustainable energy initiatives.

RESULT:-

→ The results Section will delve into the specific findings we've uncovered during our internship.

→ It will include a summary of the insights gained from our data visualizations and analyticalwork.

→ This Section should highlight key takeways from the Project, such as notable trends, Performance indicators, and data-driven recommendations.

→ On average, a standard residential Solar Panel with an output rating of around 250 to 400 watts.

→ If your home has six hours of sun light daily, you can expect to generate. approximately 546 to 874 kilowatt-hours [kwh] of electricity annually.

FUTURE SCOPE :-

The future scopes section will provide insights into what lies a head. we'll disscuss potential areas for further research and development in solar panel forecasting, as well as how our work can serve as a forecasting foundation for future projects and innovations. this will open the door to ongoing exploration and improvement in this critical field.

By structuring your report in this way, you'll offer a comprehensive view of your project, including its advantages, result, practical applications, conclusions, and future directions.

CONCLUSION :-

In the conclusion we'll 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'll Viliviate the key take aways from our work and highlight its potential impact on the field.

→ Solar energy is a clean, Pollution free and renewable Source of energy.

* Development of this Source of energy requires an accurate detailed long-term.

→ The potential taking into account Seasonal Variations.

* It will help reduce global warming and thus a future green environment with no pollution from fossil fulls, and other conventional Sources of energy.