**CAPSTONE PROJECT SYNOPSIS**

**ON**

**HI-SEAS Solar Irradiance Prediction**

|  |  |
| --- | --- |
| Batch details | Gurugram March 2020 |
| Team members | Vikas Katoch, Vinit Kumar, Kajal Sharma, Rishabh Bhardwaj, Pushkar Khosla. |
| Domain of Project | Research and Development (R&D) |
| Proposed project title | HI-SEAS Solar Irradiance Prediction |
| Group Number | 7 |
| Team Leader | Vikas Katoch |
| Mentor Name | Animesh Tiwari |

Date: 31.10.2020

Signature of the Mentor Signature of the Team Leader

|  |  |  |
| --- | --- | --- |
| Sr NO | Topic | Page No |
| 1 | Overview | 4 |
| 2 | Business problem goals | 5 |
| 3 | Topic survey in depth | 5 |
| 4 | Critical assessment of topic survey | 5 |
| 5 | Methodology to be followed |  |
| 6 | References | 5 |

**Overview:**

NASA HI-SEAS missions act as a testbed and training ground for humans as we develop the capability to explore Mars. A recent NASA Space Apps Challenge hackathon asked participants to use data collected from the HI-SEAS site to predict solar radiation given a set of measurable meteorological conditions. Knowing when conditions are most favorable for incident solar radiation is crucial for deciding when and where to deploy solar energy harvesting equipment, especially for colonists or astronauts on the surface of Mars.

These datasets are meteorological data from the HI-SEAS weather station from four months (September through December 2016) between Mission IV and Mission V.

For each dataset, the fields are:

A row number (1-n) is useful in sorting this export's results The UNIX time date (seconds since Jan 1, 1970). Useful in sorting this export's results with other export's results the date in YYYY-MM-DD format the local time of day in HH: MM: SS. 24-hour format the numeric data, if any (may be an empty string) the text data, if any (may be an empty string)

The units of each dataset are:

• Solar radiation: watts per meter^2

• Temperature: degrees Fahrenheit

• Humidity: percent

• Barometric pressure: Hg

• Wind direction: degrees

• Wind speed: miles per hour

• Sunrise/sunset: Hawaii Time

In solar energy research and application, Solar Radiation data plays a crucial role. It offers critical information on earth-striking energy and is extremely useful for modelling and developing solar thermal technologies and solar photovoltaic applications. As traditional energy sources are declining day by day, renewable energy sources Such as solar, wind, and biomass, etc., need to be used. Solar energy is generally accepted by all types of renewable energy sources since it.

In solar energy research and application, Solar Radiation data plays a crucial role. It offers critical information on earth-striking energy and is extremely useful for modelling and developing solar thermal technologies and solar photovoltaic applications. As traditional energy sources are declining day by day, renewable energy sources. Such as solar, wind, and biomass, etc., need to be used. Solar energy is generally accepted by all types of renewable energy.

**Business Problem Goals:**

In order to minimize energy costs and provide high power quality in electricity grids with distributed solar photovoltaic generations, prediction of solar irradiance is fundamental. This research formulates the problem of prediction as a problem of structured output prediction, jointly predicting multiple outputs at the same time.

**Topic survey in depth:**

To start a forecast, information on the current state of the atmosphere is necessary. The key variables needed are the three-dimensional fields of wind, temperature, and humidity and the two-dimensional field of surface pressure. Boundary variables like start of the day and end of the day are also of high importance. In this study, we are considering the sunny days we have ignored the rainy & cloudy days.

**Critical assessment of survey:**

As discussed, there is quite a reward for the peoples to know which day & what time the solar radiation will be high. Hence the primary aim of the project is to find the solar radiation. We achieve it through Machine Learning algorithms.

**Methodology to be followed:**

Since, this is research is based on a Regression Analysis. So, we will use the following methodologies:

* Linear Regression
* Ridge Regression
* Lasso Regression
* Random Forest Regressor

**References:**

|  |  |
| --- | --- |
| **Original owner of data** | Kaggle |
| **Data set information** | Solar radiation: watts per meter^2, Temperature: degrees Fahrenheit, Humidity: percent, Barometric pressure: Hg, Wind direction: degrees, Wind speed: miles per hour, Sunrise/sunset: Hawaii Time |
| **Any past relevant articles using the dataset** | N/A |
| **Reference** | N/A |
| **Link to web page** | https://www.kaggle.com/runphilrun/hi-seas-solar-radiation-prediction |