**Final Project 2022**

This is a group project. You will work together in teams to produce the forecast and prepare the presentation materials. You should designate one team member to submit the packet for your team. Please be sure that your submission is clearly labeled with the names of your team members.

**Business Scenario**

Renewable energy remains one of the most important topics for a sustainable future. Wind is one of the primary sources of renewable energy. ( https://www.energy.gov/eere/wind/how-do-wind-turbines-work). With the rise of wind farms, wind power forecasting has become an important topic. Utility companies need accurate forecasts of the amount of power being produced by wind turbines in order to ensure that they have sufficient power available to meet demand.

The attached data set contains information associated with a single wind turbine. The data were collected at 10-minute intervals. The variables included in the data set are summarized below.

|  |  |
| --- | --- |
| **Variable Name** | **Variable Description** |
| Date | Date / time stamp for each observation |
| Year | Year portion of Date |
| Month | Month portion of Date |
| Day | Day portion of Date |
| ActivePower | Active power generated by the wind turbine in kW. Note that active power can be negative. This occurs when the turbine is absorbing power from the grid. |
| AmbientTermperature | Ambient air temperature in degrees Celsius |
| WindDirection | Wind direction in degrees from the North |
| WindSpeed | Wind speed in kmph |
|  |  |

**Your task:** Create a DAILY forecast for Active Power generation for the turbine for the next 5 day period (March 31 – April 4, 2020).

You may use any of the data provided and any of the methods that we have covered in class to generate the forecast. The ambient temperature, wind direction, and wind speed for March 31 – April 4, 2020 are given below.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Ambient Temperature | Wind Direction | Wind Speed |
| 31-Mar-20 | 35.25 | 142.25 | 5.73 |
| 1-Apr-20 | 35.59 | 331.22 | 4.03 |
| 2-Apr-20 | 34.68 | 295.51 | 3.88 |
| 3-Apr-20 | 33.44 | 239.83 | 5.01 |
| 4-Apr-20 | 34.06 | 279.92 | 4.51 |

**Your deliverable consists of two parts:**

1. **Analysis Materials** – You should knit your R-code together into an html file for submission. Your code should include all data preparation, exploratory analyses, and models created as part of your analysis. Please make sure that you include comments so that someone else can easily follow your process. Please make sure that you clearly indicate the final model, including the forecast values for the next 5 days.
2. **Presentation Materials** – You should create and record a short presentation summarizing your analysis. There is no minimum time for the presentation, but it should be NO MORE than 10 minutes. You can assume that you are presenting this analysis to a group of your peers. In particular, you can assume that the audience has knowledge of forecasting, so it is appropriate to use technical terms and include technical information. Your presentation should
   1. describe any work that was done to prepare the data
   2. provide an overview / visual summary of the data that were used to generate the forecast
   3. provide an overview / summary of the modeling process
   4. include a thorough discussion of the final model and forecast – including justification for why this particular model was chosen

You should submit your slides along with a link to the video presentation.