Keene Particulate Matter Project - Roadmap Document

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## Data Science Lifecycle Research/Review

A diagram of a process

Description automatically generated

## Problem Definition and Domain Knowledge

### Problem Definition

1. To forecast, with the highest possible accuracy, when PM 2.5 levels will be elevated in the Connecticut River Valley, specifically over the City of Keene, given meteorological data gathered by KSC’s Nora Traviss.
2. To evaluate each model to optimize for a variety of factors: error, compute, number of features, and more to be determined.

## Data Collection and Sourcing

Data set is collected from a meteorological station on Water Street in Keene NH. Data was gathered and distributed by Dr. Nora Traviss for the purpose of forecasting PM 2.5 concentration in the Keene area.

TODO: Verify this information and contact Dr. Traviss or Dr. McGregor for updated data.

## Data Cleaning and Processing

Table 1: Data Features

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Code** | **Column** | **Descriptive Name** | **Type** | **Nulls** |
| F0 | Datapoint Number |  | Int [0,] | No |
| F1 | Datetime |  | Datetime | No |
| F2 | Created At |  |  |  |
| F3 | PM25 |  |  | No |
| F4 | Date |  |  |  |
| F5 | temp |  |  | No |
| F6 | dewpoint |  |  | No |
| F7 | RH |  |  | No |
| F8 | windDIR |  |  | No |
| F9 | windMPH |  |  | No |
| F10 | precip |  |  | No |
| F11 | mslp |  |  | No |
| F12 | visibility |  |  | No |
| F13 | gust |  |  | No |
| F14 | wxcodes |  |  | Yes |
| F15 | (top) Snow Depth (in) |  |  | No |
| F16 | (middle) Snow Depth (in) |  |  | No |
| F17 | (bottom) Snow Depth (in) |  |  | No |
| F18 | (top) Snow Temp. (deg. F) |  |  | No |
| F19 | (middle) Snow Temp. (deg. F) |  |  | No |
| F20 | (bottom) Snow Temp. (deg. F) |  |  | No |
| F21 | (top) Snow Density (%) |  |  | No |
| F22 | (middle) Snow Density (%) |  |  | No |
| F23 | (bottom) Snow Density (%) |  |  | No |
| F24 | Date w/o Time |  |  | Yes |
| F25 | Hour |  |  |  |
| F26 | Forecasted from 0 UTC |  |  | Yes |
| F27 | FEW |  |  |  |
| F28 | SCT |  |  |  |
| F29 | BKN |  |  |  |
| F30 | OVC |  |  |  |
| F31 | VV |  |  |  |
| F32 | Clouds |  |  |  |
| F33 | Clds1000 |  |  |  |
| F34 | Clds2000 |  |  |  |
| F35 | Clds3000 |  |  |  |
| F36 | Clds4000 |  |  |  |
| F37 | Clds5000 |  |  |  |
| F37 | Clds6000 |  |  |  |
| F38 | Clds7000 |  |  |  |
| F39 | Clds8000 |  |  |  |
| F40 | Clds9000 |  |  |  |
| F41 | Clds10000 |  |  |  |

### Data Cleaning

Replace missing values

### Feature Engineering

Each feature \* Each feature

## Exploratory Data Analysis

<https://www.stat.cmu.edu/~hseltman/309/Book/chapter4.pdf>

Summary stats

Histograms, boxplots, scatterplots

Correlation analysis

Hypothesis testing

## Model Building and Evaluation

## Model Results

## Model Deployment