**The standard air quality level with the index of AQI**

|  |  |
| --- | --- |
| AQI | Air quality level |
| 0-50 | Good (G) |
| 51-100 | Moderate (M) |
| 101-150 | Unhealthy for sensitive groups (U-S) |
| 151-200 | Unhealthy (U) |
| 201-300 | Very unhealthy (VU) |
| 301-500 | Hazardous (H) |

**Definition 1**:

In predicting smog pollution in the following periods (e.g., the next 24 hours), we divide the pollution into types:

|  |  |
| --- | --- |
| Predicting Types | Definition |
| None-Pollution | AQI <= 100 at all hours |
| Slight-Pollution | AQI <=200 at all hours and AQI >-101 at some hour(s) |
| Severe-Pollution | AQI >=201 at some hour(s) |

We use a vector as the label of a period:



Example: (1, 0, 0) stands for Severe-Pollution

**Definition 2:**

City Evolution Graph (***G***): a *fully connected* and *directed* network







, where vi represents a city, n is the number of cities, eij represents the evolution factor of vi to vj

**Definition 3:**

Smog pollution predictor:

, where t represents a time period, e.g., the next 24 hours, represents a spatial classifier for the time period t,  represents a temporal classifier for the time period t, f represents a co-training framework.

**Problem 1:**

Given:

1. Daily aerosol optical thickness records in the past 12 years
2. Hourly PM2.5, PM10, wind direction, wind speed, AQI records in the past one year

Purpose:

Calculate locally dynamic evolution factor eij from ith city to jth city

**Problem 2:**

Given:

For ith city, spatial feature sets:

1. Wind direction, wind speed, PM2.5 and PM10 of the other (n-1) cities.
2. Locally dynamic evolution factors from the other (n-1) cities.

Temporal feature sets:

1. Current ground sensor observations including meteorological elements and air quality concentrations of ith city
2. Forecasted meteorological elements of ith city

Purpose:

Train smog pollution predictor, and predict the city’s pollution levels in the next periods: L1, L2, …

Confusing me: whether evolution factors should be locally dynamic or relatively static?