

# Smart Dust: Knowledge Analysis of Environmental Allergens and Pollutants in Delhi through Millimetre Motes - using Data Mining

Navneet Popli, Pritika Sachdeva, Gautam Bhardawaj

**Abstract:** - We made a system of smart dust motes to inform a person about various kinds of allergies that he may be prone to if he enters a particular area in Delhi. We used, Mica Z Motes from the company 'Crossbow'. They were placed in various areas of Delhi. All this data went to the cloud. Here we had a 'Personal Health Record' of a person and details like chemist shops and doctors in that area. We also put details of online doctors whom the user can consult. Useful analysis like what precautions can he take, what is the name, phone number and shortest path to a nearby local doctor or a chemist shop etc. was derived from this application.

**Keywords:**-Smart Dust, Aeroallergens, Motes, Sensor, Mica Z Motes, Data Mining, Rapid Miner, Hadoop

## I. INTRODUCTION

### • SMART DUST

Smart Dust is a system of tiny micro electromechanical sensors which communicate with each other and then with the base station to provide and analyze a variety of information. Today they are available in millimetre sizes but scientists will soon come out with nano particles almost of the size of dust. A smart dust particle or mote is a wireless sensor with sensing, computation, communication and power all in a single package. They are low power and inexpensive. When employed in an area, they form an ad-hoc sensor network and transmit useful information like temperature, humidity, acceleration, air quality, sound etc. Thus these particles can be used in a variety of applications ranging from battlefield surveillance to habitat monitoring. From forest fire detection to smart cities, smart packaging and smart agriculture. Smart dust are cubic millimetre motes which were first envisioned in the 1990's by science fiction novelists and were brought to reality by 3 people from the University of California- Kris Pister, Joe Kahn and Bernhard Boser. The emergence of such sporadic connectivity and increased interaction with the environment provided many opportunities to reshape interactions between people and computers spurring ubiquitous computing research. Thus they will be light enough to remain suspended in air for hours. As the motes drift on wind, they can monitor the environment for light, sound, temperature, chemical composition and a wide range of other information, and beam that data back to the base station, miles away.

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### • ALLERGY SITUATION IN DELHI

Delhi is the capital city of India. The main reasons for allergies in Delhi are:

1. Pollen
2. Dust
3. Air pollution

Delhi is known for extreme temperatures, both in summers and in winters. The neighboring states of Delhi are Haryana, Rajasthan and Uttar Pradesh. Rajasthan is primarily a desert. During peak summers, heavy dust storms come in Delhi from Rajasthan, bringing in its wake allergies associated with dust. The green belt of Haryana and Uttar Pradesh also contributes to several allergies which are related to the pollen released from the grass, trees and other such sources. Some of the common allergies which strike Delhi from time to time are:

- Hay Fever or Allergic Rhinitis
- Sore Eyes or Allergic Conjunctivitis
- Asthma

Aeroallergens are the basic reason of respiratory diseases, particularly asthma and rhinitis. Pollen, fungi, animal dander, dust mites, domestic pets, and insects act as triggering factors. Thus a person can suffer from allergies both inside the house and outside. Not only that, in Metro liked Delhi traffic pollution is also a major factor contributing to many cases of asthma. 1 out of every 5 children in Delhi suffer from diseases like cough, common cold, allergy etc.

### • WORKING

#### a) SYSTEM:

In this system millimetre scale wireless sensor motes were installed in the surroundings of a person with local base stations. These motes analyzed air quality for the presence of allergens that this person could be affected by. This data was sent to the cloud. Medical history of a person, information about local chemists and doctors in the area and addresses of online doctors was also put in the cloud. A data mining tool called 'Rapid Miner' was used for mining. Sql queries were used to perform useful analysis like whether air in the area where a person is entering has a particular allergen or not. If the allergen is present then what are the medical conditions that can be caused by this allergen, the medicines required to treat this condition, precautions that can be taken, all the chemist shops in that area and their navigation and if required, connection to a medic online. A person had a small laptop as a display device to show the relevant results.

#### b) SMART DUST MOTE

Is made up of the following components:

- Sensors for collecting data

- A radio transceiver with an antenna.
- A microcontroller which will be an electronic circuit for interfacing with the sensors.
- An energy source, usually a battery .
- ADC
- External memory(optional)

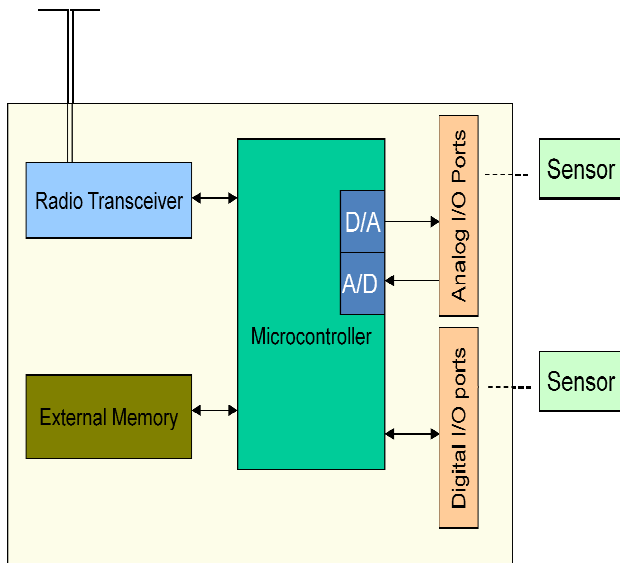


Fig. 1: Components of a Mote

## II. MICROCONTROLLER

A Microcontroller runs a smart dust mote. It determines which task is to be performed by a mote and also which components should be powered up and which should be sleeping so that energy can be conserved. It contains flash memory for program storage and RAM for program execution. The microcontroller does in-node processing. It gets signal from a mote , processes the data and stores it in the memory. It also powers the optical receiver to find out if any other mote is trying to communicate with it. A Microcontroller also captures analog signals, convert them to digital values, and then process the data for transmission to a host system. Microcontroller consumes most power in a mote. Because of high power consumption, a mote should be made to sleep whenever possible.

## III. TRANSCEIVER

Transceivers have the functionalities of both transmitter and receiver. The states are transmit, receive, idle, and sleep. They use ISM band- radio bands which are license free and actually reserved for the use of radio frequency (RF) energy for industrial, scientific and medical purposes. It is a globally available band. They can use wireless transmission media like radio frequency (RF), optical communication (laser) and infrared. Lasers need less power, but there is requirement for line-of-sight communication. Infrared, have very less broadcasting capacity. Radio frequency-based communication is the best for WSN applications.

### Power Source:

Source of power for sensors are capacitors and rechargeable and non rechargeable batteries. The power system of Smart dust consists of a thick battery , a solar cell with charge integrating capacitor and depending upon the objectives , design integrates various sensors such as light , temperature

, vibration etc. The mote size makes energy management a key component. Capacitor and battery stores approximately 1 joule mm to 10 millijoule per cubic mm.

### Sensors:

Sensors are hardware devices that produce a measurable response to a change in a physical condition like temperature or pressure. The continual analog signal produced by the sensors is digitized by an analog-to-digital converter (ADC) and sent to controllers for further processing. A sensor node should be small in size, consume extremely low energy, operate in high volumetric densities, be autonomous, operate unattended, and be adaptive to the environment.

### A) FUNCTIONING:

- 1) Periodically the microcontroller gets a reading from one of the sensors, processes the data, and stores it in memory.
- 2) It also occasionally turns on the receiver to see if anyone is trying to communicate with it.
- 3) In response to a message the microcontroller will use the corner cube retro reflector or laser to transmit sensor data or a message to a base station or another mote. A large numbers of motes communicate with each other and form ad hoc networks. The motes that would bring this concept to reality would be the MICAz motes from the company Crossbow. The MICAz is a 2.4 GHz Mote used for enabling low-power, wireless sensor networks. A MICAz mote has a IEEE 802.15.4 compliant RF transceiver( IEEE 802.15.4 is a standard which tells the specifications of physical and media access control layer for low –rate wireless personal area networks). The ISM band which it uses is 2.4 to 2.48 GHz. The data rate is 250 kbps.

### Processor and Radio

MPR2400 is a single processor board which runs the sensor application and radio communication simultaneously. MPR2400 is based on ATmega128L. It is an 8 bit Atmel Microcontroller with 128 kb in-system programmable flash memory. MoteWorks runs from this flash memory.



Fig. 2: MicaZ Mote

### Mote Works Platform

Mote Works is an open standards based software platform for the development of Wireless sensor networks. It supports Mote Network, Server and Client tier.

### Sensor Boards

Many different types of sensor boards are available for the MICAz mote. All these connect to the mote via a 51-pin expansion connector.

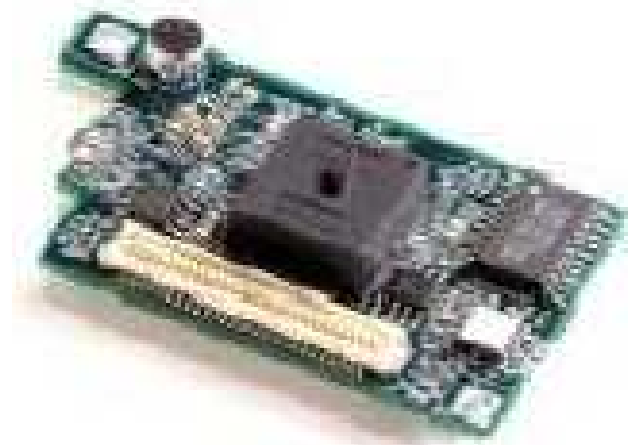


Fig. 3: Sensor Board

### Base station

A base station collects data from the motes and sends it to the PC. The MIB510, MIB520 or MIB600 can be used.



Fig. 4: Base Interface

### TinyOS

TinyOS is the operating system in a mote. It is an open source, BSD licensed operating system. This operating system requires only 512 bytes of RAM which is approximately the amount of processing power found in a toaster. It requires nesC to program in TinyOS.

### TinyDB

TinyDB is a query processing system which is used for getting and processing information from a network of mote sensors. It gives SQL like interface. It collects data from motes in the environment, filters it, aggregates it together, and routes it out to a PC. TinyDB does this via power-efficient in-network processing algorithms.

## IV. DATA MINING & TECHNIQUE USED

Data mining is the process of analyzing data from different perspectives and summarizing it into useful information. It is a knowledge discovery process which allows users to analyze data from many different dimensions or angles, categorize it, and summarize the relationships

identified. Data mining basically deals with two aspects i.e. relationships and patterns. Data mining provides us with the useful analysis from the large data sets into the form of charts, clusters and tables which can be beneficial for the end user to make the relevant analysis and predictions for future. s. Data Mining is a powerful tool capable of handling decision making and for forecasting future trends of market. In our research data mining helped us analysis our data in 3 basic steps:

**Exploration:** - this stage started with data preparation involved data preparation which may involve cleaning data, data transformations, selecting subsets of records and - in case of data sets with large numbers of variables.

**Model building and evaluation:** this stage involved considering various models and choosing the best one based on their predictive performance on the basis of various data mining tools i.e. neural networks, cluster analysis but in our research we took the simplest technique i.e. classification and predication.

**Deployment:** - this final stage involves using the model (technique) selected as best in the previous stage and applying it to new data in order to generate predictions or estimates of the expected outcome. Technique used during our analysis is classification and prediction along with the association rule. Classification and prediction is used to analyse and predict the future trends for a given data set and it is one of the simplest form of data mining tool wherein the analysis provide us with the better understanding of the large data . In our research the technique helped in the same way of predicting and analysing the data been collected from various aspects like temperature, humidity, wind, pollen index etc. and the analysis from such data can be used to know the various details like nearby chemist shop, medic online and the prescribed treatment for the same. Association rule wherein is all about discovering frequent patterns, co-relations, associations or casual structures between a given set of data in transactional and relational databases along with other information repositories. The basic applications been performed by association rule is market basket analysis, cross – marketing etc. Association rules tends to analyse different relations between objects, easy to understand, and effective and efficient at the same time.

## V. DATA MINING TOOL (RAPID MINER)

Rapid Miner, the leader in Predictive Analytics, delivers an easy-to-use desktop-to-cloud solution. Rapid Miner Studio breaks away from the limitations of traditional data analysis tools and allows working with large data sources. Rapid Miner Studio runs on every major platform and operating system. Rapid miner is a commonly used data mining toolset with exceptional GUI interface and broad capability. This application provides pre-built workflows and a new statistics view provides many statistical graphs and summaries of data for predictions and analysis. Rapid miner is an open and extensible tool for Hundreds of data loading, data transformation, data modelling, and data visualization methods with access to a comprehensive list of data sources like Excel, Access, Oracle, IBM DB2, Microsoft SQL, Sybase, Ingres, MySQL, Postgres, SPSS, dBase, and Text files.

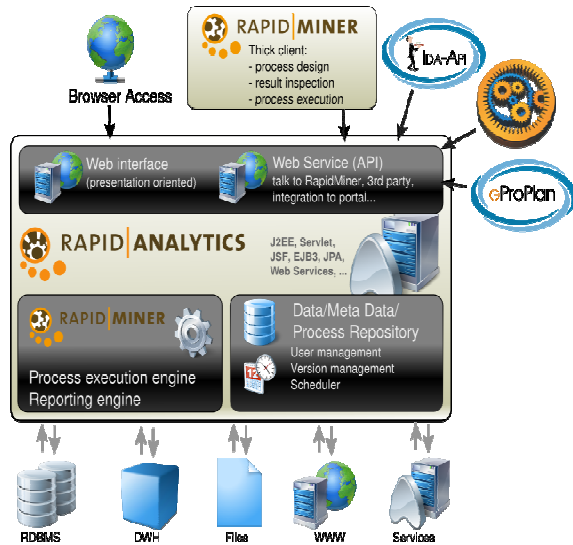


Fig. 5: Rapid Miner

VI. IMPLEMENTATION

Our work involved installing these motes in various parts of Delhi-the capital city of India. The areas were:

1. R.K.Puram,
2. Punjabi Bagh ,
3. I.G.I Airport and
4. Anand Vihar

The RF Transmitter for a MicaZ mote has an outdoor range of 75-100 meter and the transmit data rate of 259 kbps. In all these areas also, we chose the locations which were

likely to be highly polluted and close to high concentration pollen grounds. To track the actual cause of highly notable aero allergies in Delhi, the air quality was monitored for 1 month everyday at 2 hour intervals. The motes were installed to measure the Air quality composition and pollen index. The factors which were considered while preparing the analysis are –

1. Percentage of various allergy causing components in the air like CO, O3, PM2.5, PM 10 etc. PM is particulate matter (dust), PM2.5 is fine particulate matter and PM10 are coarse particulate matter.
2. Percentage of the pollen- grass, tree and weed pollen.
3. Capability of the these components to cause allergy and
4. Buoyancy (wind speed) that controls spread of these components, specially pollen and dust.

VII. DATA ACQUISITION

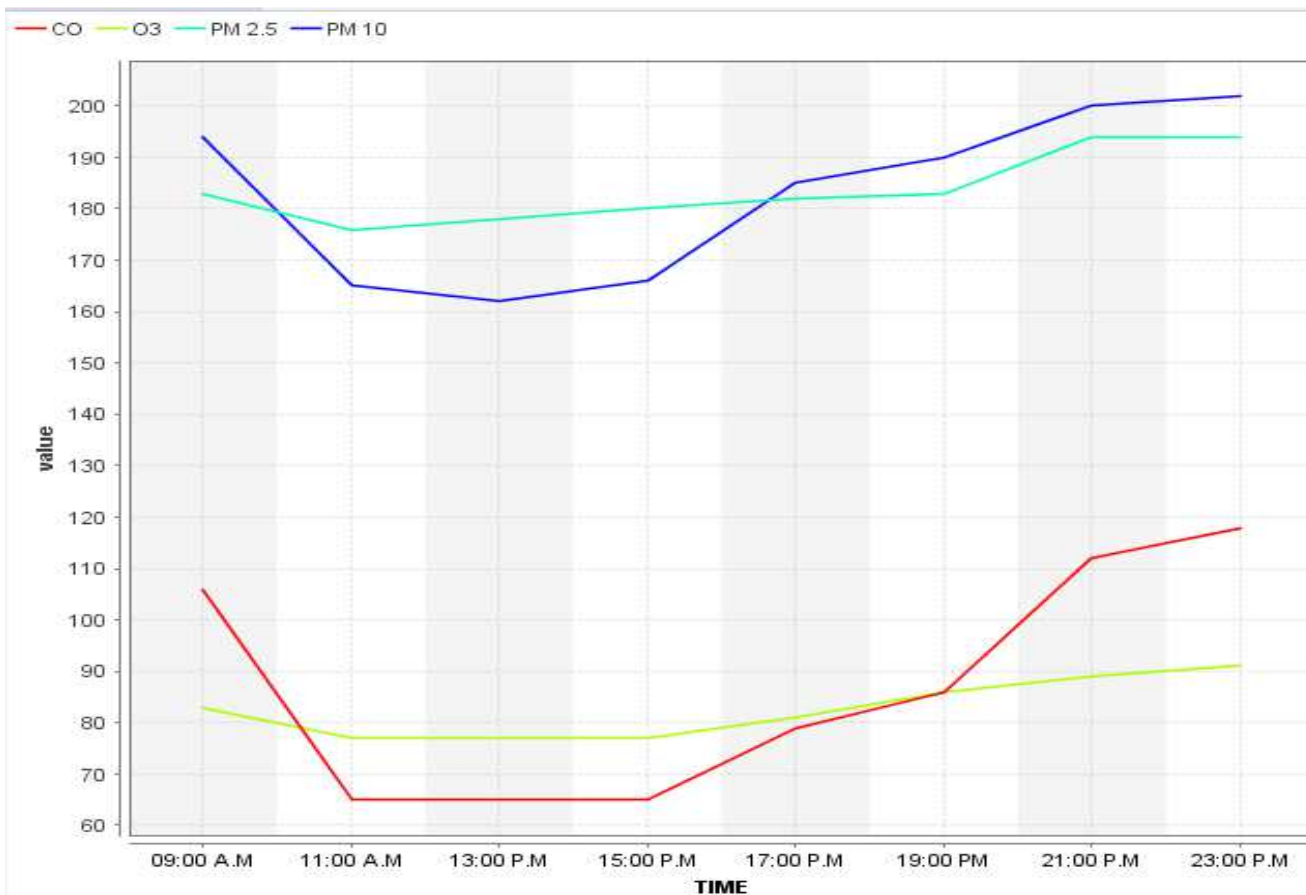
For the purpose of analysis, air composition data was taken for a month, everyday at an interval of 3 hours. Here for a sample, we have shown just one table of 4<sup>th</sup> July for air composition-CO, O3, PM 2.5 and PM 10. Also pollen levels were measured for tree, weed and grass pollen. Also we have shown whether a particular combination of different allergens make the air healthy, unhealthy, very unhealthy or moderate for sensitive people.

VIII. AIR COMPOSITION DATA

- ANAND VIHAR
  - 4<sup>th</sup> JULY

TIME	CO	O3	PM 2.5	PM 10	AIR POLLUTION LEVEL
09:00 A.M	106	83	183	194	unhealthy for sensitive group
11:00 A.M	65	77	176	165	moderate
13:00 P.M	65	77	178	162	moderate
15:00 P.M	65	77	180	166	moderate
17:00 P.M	79	81	182	185	unhealthy for sensitive group
19:00 P.M	86	86	183	190	unhealthy
21:00 P.M	112	89	194	200	very unhealthy
23:00 P.M	118	91	194	202	very unhealthy

Table 1: Air Composition of Anand Vihar on 4<sup>th</sup> July



Graph 1: Analysis of air composition of Anand Vihar on 4<sup>th</sup> July using Rapid miner

KEY

<span style="color: red;">—</span>	CO
<span style="color: yellow;">—</span>	O3
<span style="color: green;">—</span>	PM 2.5
<span style="color: blue;">—</span>	PM 10

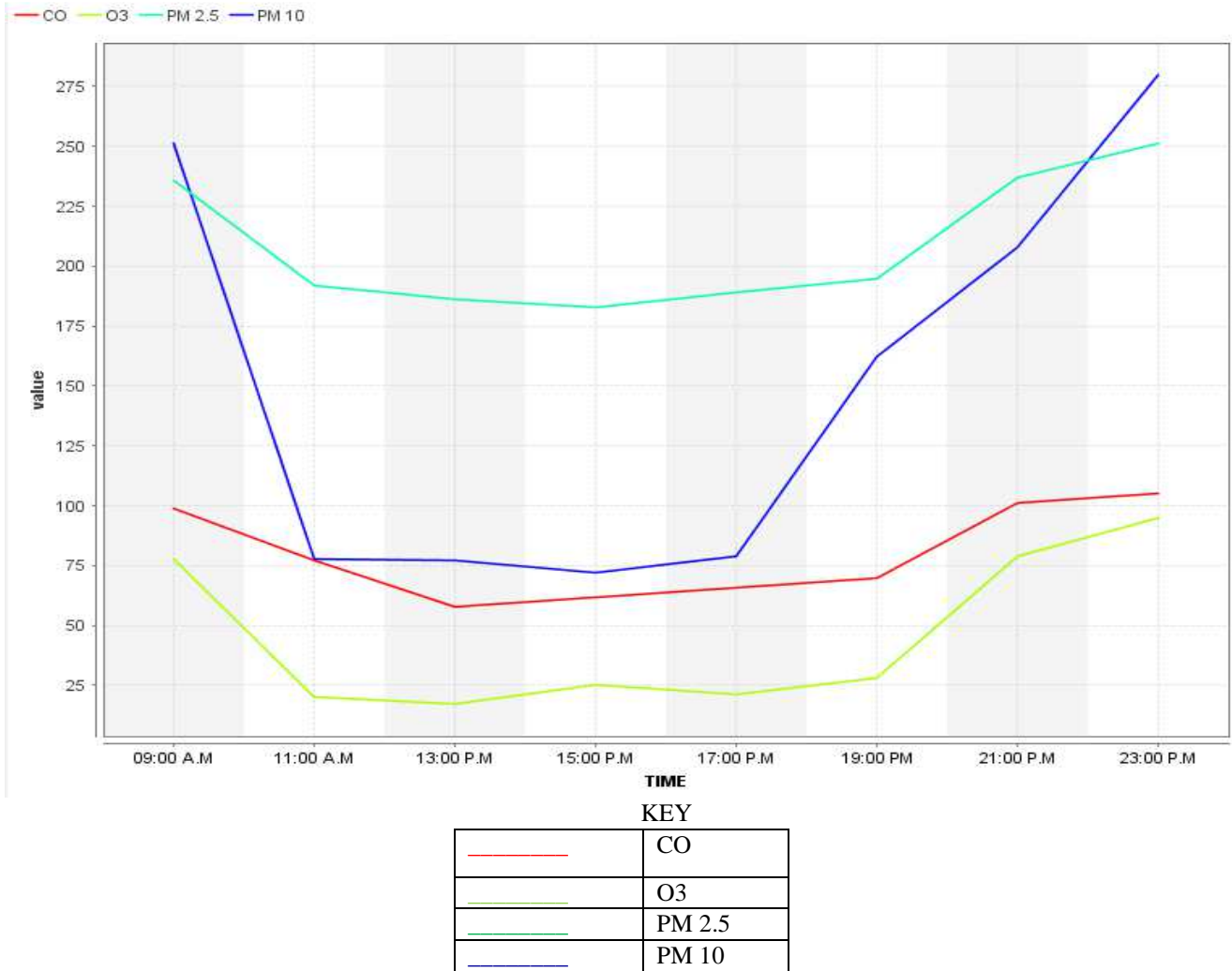
The analysis shows the growth in PM 10 and PM 2.5 during rush hours mainly around morning 9:30 and evening 7:00 – 8:00. Sources of these fine pollution particles (PM 2.5) include all types of combustion, including motor vehicles, power plants, residential wood burning, forest fires, agricultural burning, and some industrial processes whereas Sources of coarse particles (PM 10) include crushing or grinding operations, and dust stirred up by vehicles travelling on roads.

IX. PUNJABI BAGH

o 4<sup>th</sup> JULY

TIME	CO	O3	PM 2.5	PM 10	AIR POLLUTION LEVEL
09:00 A.M	99	78	236	251	unhealthy for sensitive group
11:00 A.M	77	20	192	78	unhealthy
13:00 P.M	58	17	186	77	moderate
15:00 P.M	62	25	183	72	moderate
17:00 P.M	66	21	189	79	unhealthy for sensitive group
19:00 PM	70	28	195	162	very unhealthy
21:00 P.M	101	79	237	208	very unhealthy
23:00 P.M	105	95	251	280	very unhealthy

Table 2: Air composition of Punjabi Bagh on 4<sup>th</sup> July



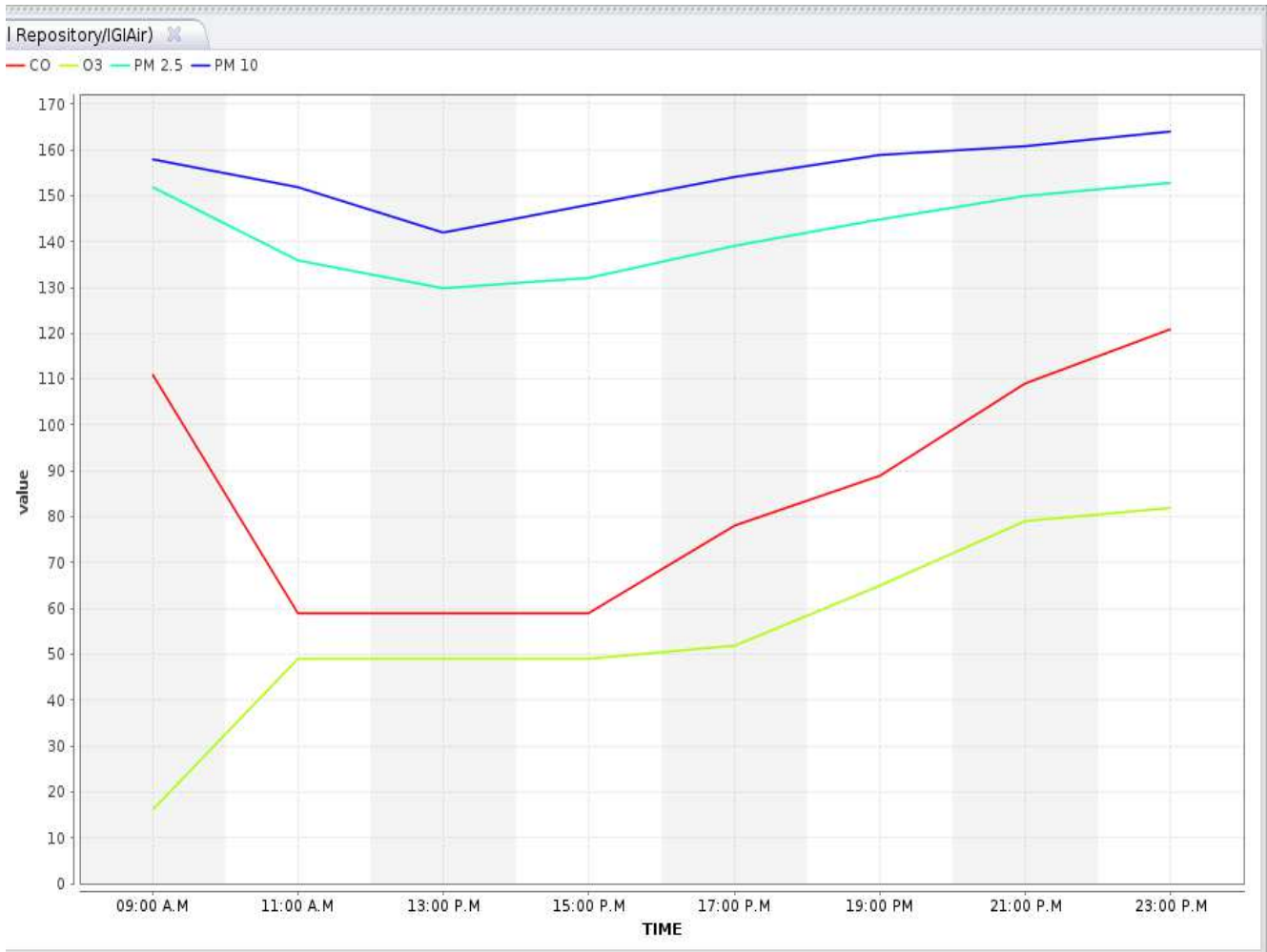
Graph 2: Analysis of air composition of Punjabi Bagh on 4<sup>th</sup> July using Rapid miner

The analysis shows the growth in PM 10 and PM 2.5 during rush hours mainly around morning 9:30 and evening 7:00 – 8:00. PM 10 grows at a high rate in morning and in late evening and the sources of these coarse particles are crushing or grinding operations, and dust stirred up by vehicles travelling on roads.

X. I.G.I AIRPORT  
4<sup>th</sup> JULY

TIME	CO	O3	PM 2.5	PM 10	AIR POLLUTION LEVEL
09:00 A.M	111	16	152	158	unhealthy for sensitive group
11:00 A.M	59	49	136	152	moderate
13:00 P.M	59	49	130	142	moderate
15:00 P.M	59	49	132	148	moderate
17:00 P.M	78	52	139	154	unhealthy for sensitive group
19:00 PM	89	65	145	159	unhealthy
21:00 P.M	109	79	150	161	very unhealthy
23:00 P.M	121	82	153	164	very unhealthy

Table 3: Air composition of I.G.I Airport on 4<sup>th</sup> July



KEY

	CO
	O3
	PM 2.5
	PM 10

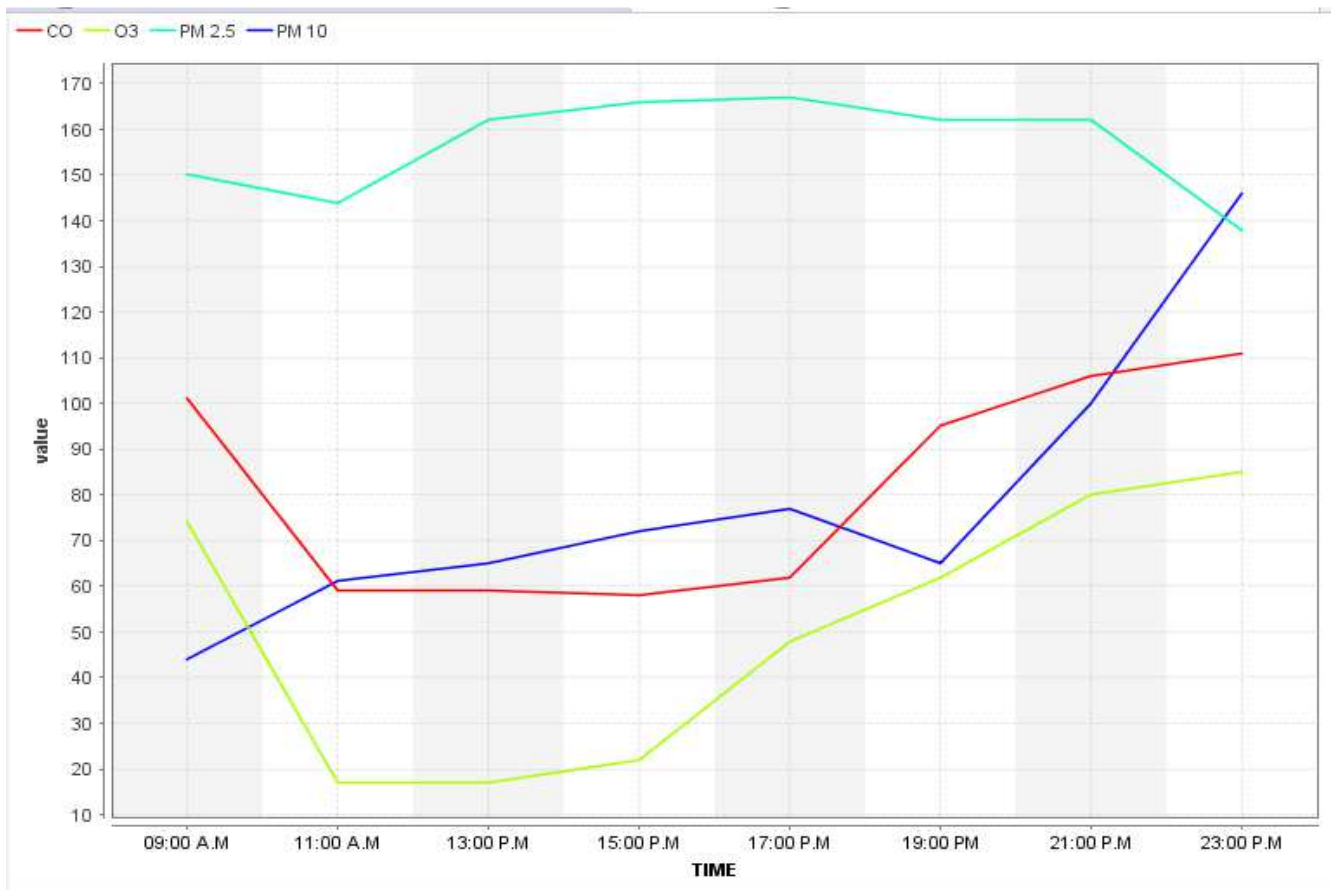
**Graph 3: Analysis of air composition of I.G.I Airport on 4<sup>th</sup> July using Rapid miner**

The analysis shows the high level of PM2.5 and PM 10 with a slight increase in CO and NO3 during rush hours in morning and evening. I.G.I airport is a highly allergic area as it deals with increased PM2.5 and PM 10 because of movement of airplanes due to which dust movement is at a high rate leading to misbalance in the composition.

**XI. R.K PURAM**

TIME	CO	O3	PM 2.5	PM 10	AIR POLLUTION LEVEL
09:00 A.M	101	74	150	44	unhealthy for sensitive groups
11:00 A.M	59	17	144	61	Moderate
13:00 P.M	59	17	162	65	Moderate
15:00 P.M	58	22	166	72	Moderate
17:00 P.M	62	48	167	77	unhealthy for sensitive groups
19:00 P.M	95	62	162	65	unhealthy
21:00 P.M	106	80	162	100	unhealthy
23:00 P.M	111	85	138	146	very unhealthy

**Table 4: Air composition of R.K.Puram on 4<sup>th</sup> July**



KEY

<span style="color: red;">—</span>	CO
<span style="color: yellow;">—</span>	O3
<span style="color: green;">—</span>	PM2.5
<span style="color: blue;">—</span>	PM10

**Graph 4: Analysis of air composition of R.K Puram on 4<sup>th</sup> July using Rapid miner**

The analysis shows the high level of PM2.5 and PM 10 with a slight increase in CO and NO3 during rush hours in morning and evening. PM 10 specially shows high increase in the evening because of high amount of coarse particulate matter because of adjoining factories.

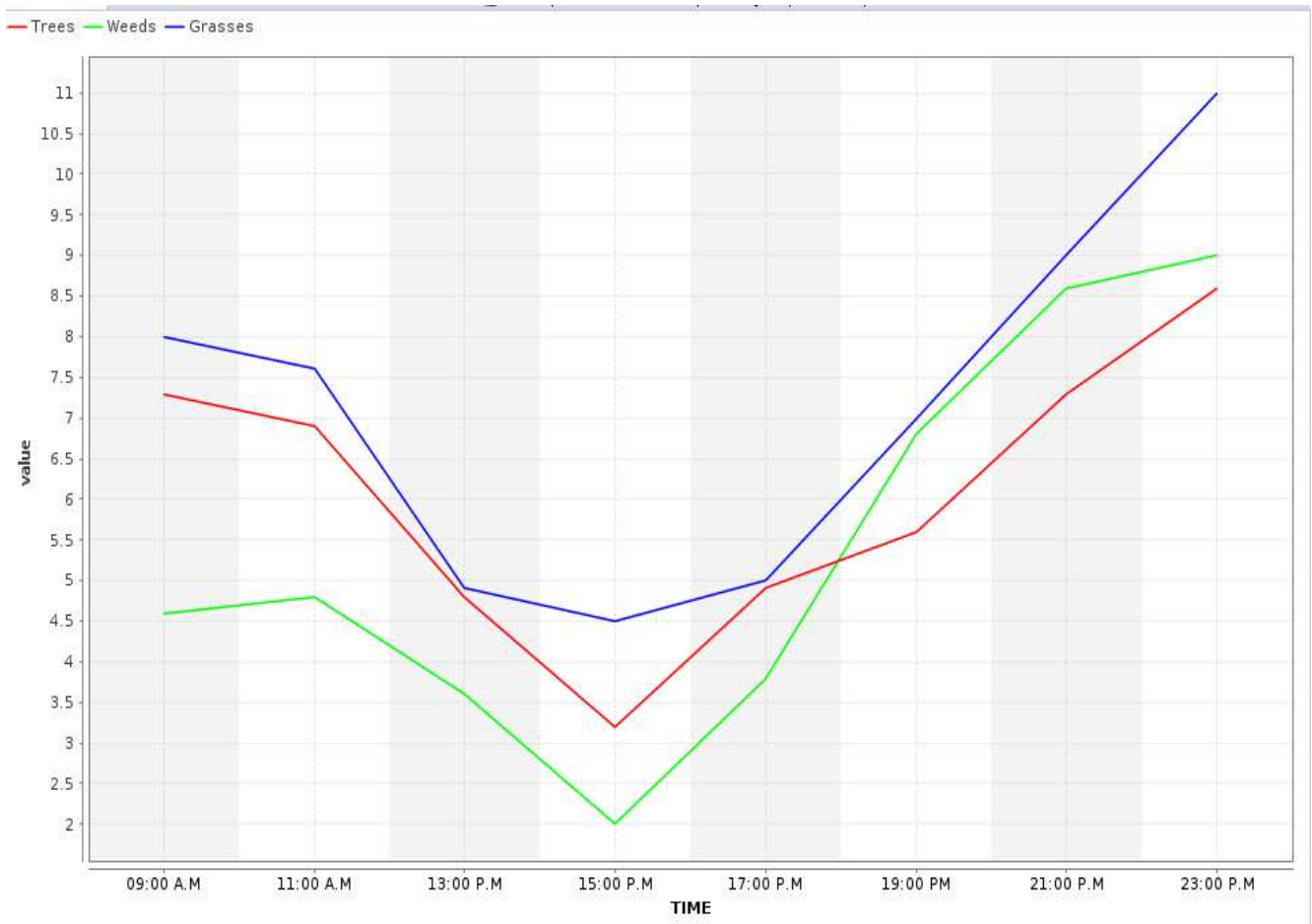
## XII. POLLEN COUNT

- ANAND VIHAR
  - 4<sup>th</sup> July

TIME	Trees	Weeds	Grasses	Pollen allergic level	allergic influence
09:00	7.3	4.6	8	high	yes
11:00	6.9	4.8	7.6	high	yes
13:00	4.8	3.6	4.9	medium	yes
15:00	3.2	2	4.5	low	no
17:00	4.9	3.8	5	medium	yes
19:00	5.6	6.8	7	medium	yes
21:00	7.3	8.6	9	high	yes
23:00	8.6	9	11	high	yes

**Table 5.1: Pollen Count for Anand Vihar on 4<sup>th</sup> July**





KEY

<span style="color: red;">—</span>	Trees
<span style="color: green;">—</span>	Weeds
<span style="color: blue;">—</span>	Grasses

**Figure 5.1: Analysis of Pollen Count of Anand Vihar on 4<sup>th</sup> July using Rapid miner**

The analysis from the above graph shows the high growth of all pollen types in morning and till afternoon it starts dipping down to almost negligible and weed seeds are the most commonly found pollen type in Anand Vihar.

### XIII. PUNJABI BAGH

o 4<sup>th</sup> JULY

TIME	Trees	Weeds	Grasses	pollen allergic level	Allergic influence
09:00 A.M	10.6	7	8.3	high	yes
11:00 A.M	9.2	6.5	8	high	yes
13:00 P.M	2.5	3.6	2.2	low	no
15:00 P.M	2.4	1.9	2.4	low	no
17:00 P.M	4.9	5.3	6	medium	yes
19:00 P.M	7.3	8	8.3	medium	yes
21:00 P.M	8.9	8	9	medium	yes
23:00 P.M	9.8	6.5	10.2	high	yes

**Table 6.1: Pollen Count for Punjabi Bagh on 4<sup>th</sup> July**

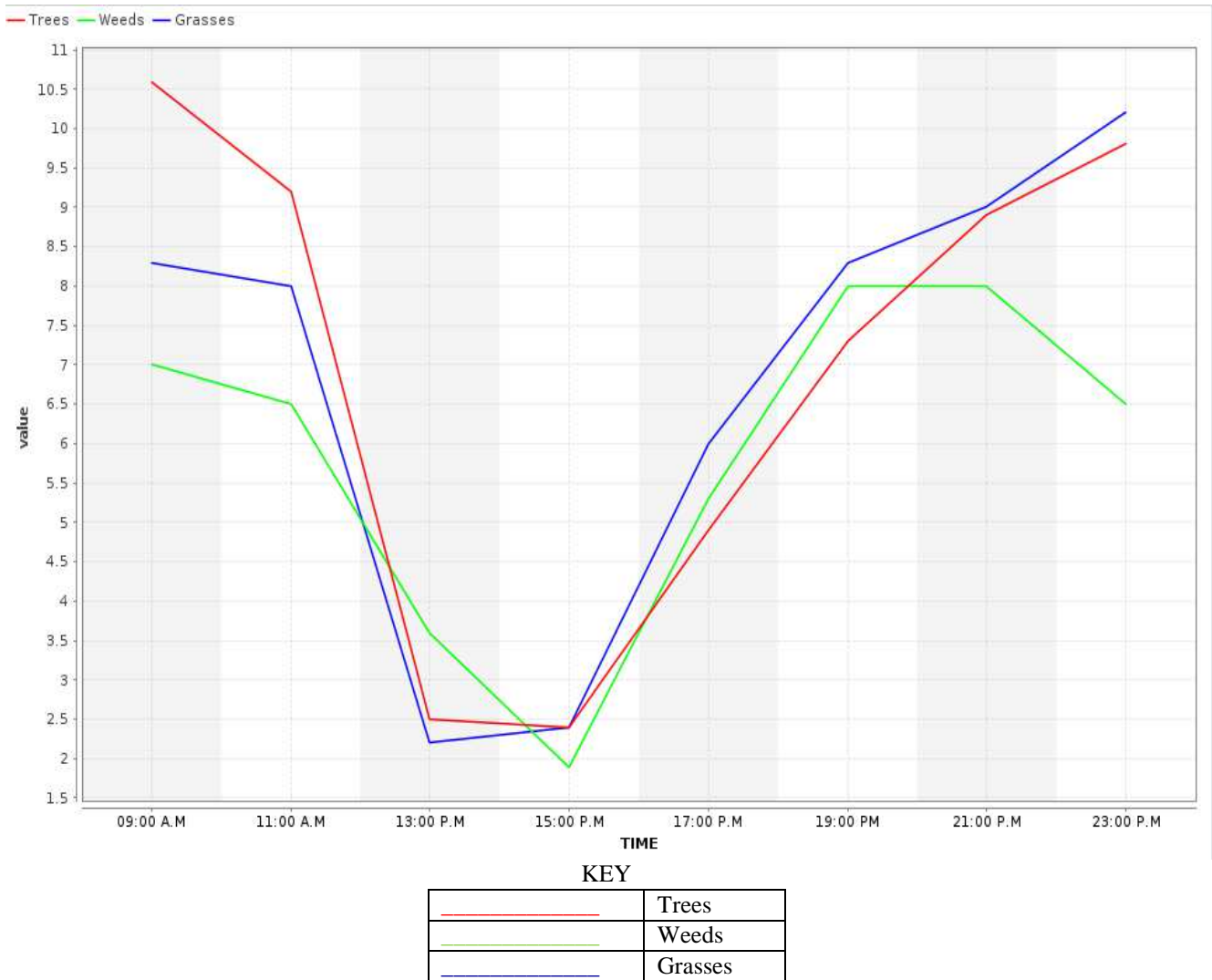


Figure 6.1: Analysis of Pollen Count of Punjabi Bagh on 4<sup>th</sup> July using Rapid miner

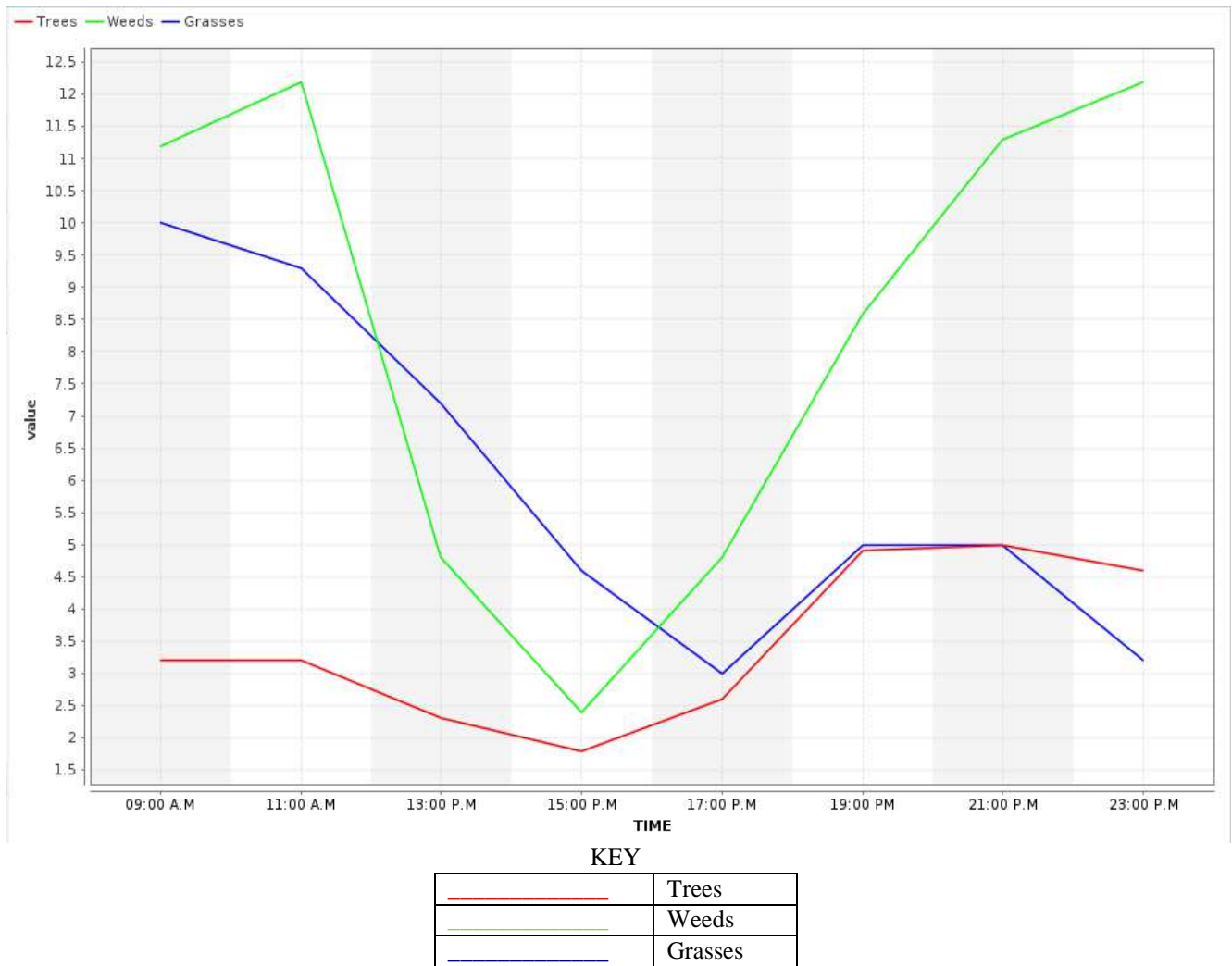
The analysis from the above graph shows the high level of pollen count in Punjabi bagh and seeds from trees are the one highly affecting the allergens in Delhi. Till afternoon, the pollen count decreases at a high rate.

XIV. I.G.I AIRPORT

o 4<sup>th</sup> JULY

TIME	Trees	Weeds	Grasses	Pollen Allergic level	allergic influence
09:00 A.M	3.2	11.2	10	high	yes
11:00 A.M	3.2	12.2	9.3	high	yes
13:00 P.M	2.3	4.8	7.2	medium	yes
15:00 P.M	1.8	2.4	4.6	low	no
17:00 P.M	2.6	4.8	3	medium	yes
19:00 PM	4.9	8.6	5	medium	yes
21:00 P.M	5	11.3	5	high	yes
23:00 P.M	4.6	12.2	3.2	high	yes

Table 7.1: Pollen Count for I.G.I Airport on 4<sup>th</sup> July



**Figure 7.1: Analysis of Pollen Count of I.G.I Airport on 4<sup>th</sup> July using Rapid miner**

The analysis from the above graph shows the high level of pollen count in I.G.I Airport mainly weeds and it remains high throughout the day whereas the count of other type of pollen decreases till late evening.

**XV. R.K PURAM**

o 4<sup>th</sup> JULY

TIME	POLLEN COUNT			ALLERGY LEVEL
	Trees	Weeds	Grasses	
09:00 A.M	9.9	7.6	8.3	High
11:00 A.M	9.8	7.6	8	high
13:00 P.M	5.2	3.6	2.8	medium
15:00 P.M	2.2	3.6	2.8	low
17:00 P.M	6.3	6	5.8	medium
19:00 P.M	7.4	6	6	high
21:00 P.M	9.7	7.6	7	high
23:00 P.M	8.3	7	6.2	medium

**Table 8.1: Pollen Count for R.K Puram on 4<sup>th</sup> July**

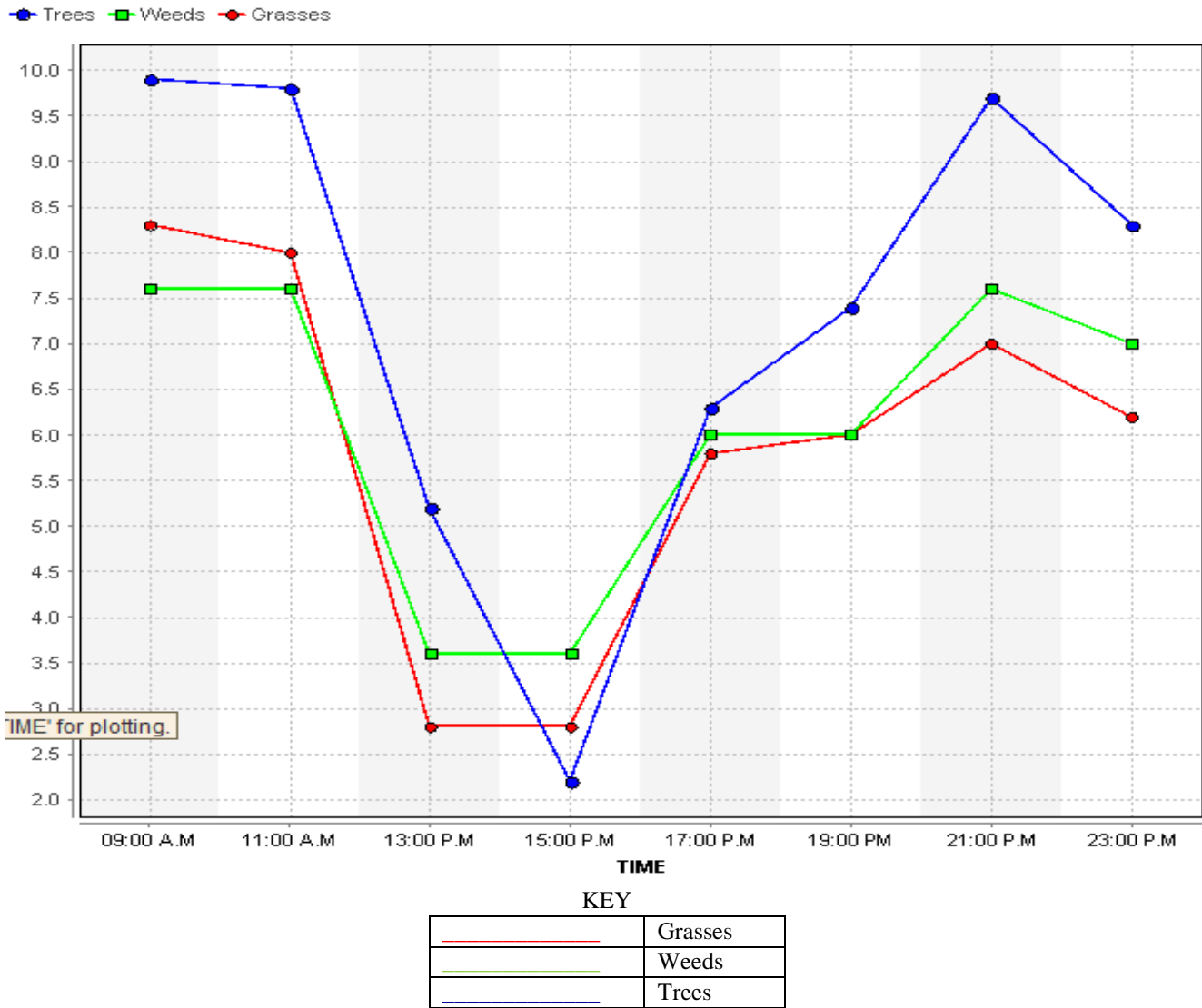


Figure 8.1: Analysis of Pollen Count of R.K Puram on 4th July using Rapid miner

The analysis from the above graph shows the high level of tree pollen count at R.K.Puram mainly because of the green area in South Delhi.

### XVI. MEDICINES PRESCRIBED FOR ALLERGIES

Different medicines are prescribed for different kinds of allergies. The medicines and dosages depend on several factors like symptoms of the patient, age, weight, previous medical history etc. However, general information was collected from doctors and the following table was prepared.

MEDICINE NAME	SYMPTOMS	TRADE NAMES	DOSAGE	PRECAUTIONS
Acetaminophen Aspirin Tablet	Common Cold (Viral Rhinitis), Flu, Headache	Aspirin	Adults and children 12 years and over: take 1 tablet every 4 hours	Do not stop taking this medication without consulting your doctor. Do not give this medication to anyone else, even if they have the same symptoms as you do. It can be harmful for people to take this medication if their doctor has not prescribed it.
Cetirizine	Best for allergic reactions	A Cet (10mg) A - Rest   Aalervin Plus (60 ml) Acepe   Acitid (10mg)	Adults: recommended dose is 10 mg once	Caution should be exercised in patients with history of kidney or liver disease, any allergy, who are taking other medications, elderly, children, during pregnancy and breast-feeding. Avoid alcohol consumption.

Clemastine		Tavegyl   Tavegyl   Clamist   Tavegyl	Adult: Allergic conditions- 1 mg twice daily, up to 6 g/day. IV- Prophylaxis of acute allergic conditions- 2 mg/day. IV/IM- Acute allergic reactions- 4 mg/day.	Avoid maximum sun exposure. Avoid excess dosage.
Desloratadine	Prescribed for allergic reactions in patients 2 years of age and older. It blocks histamine's action, which reduces allergy symptoms	Allerdain   Neoloridin DT   Neoloridin   Repitab   Lora -J   Otrivin	It comes as a tablet to taken by mouth, with or without food.	It may cause dizziness, do not drive a car or operate machinery while taking this medication.
Dimethindene	This medication is an antihistamine, prescribed for severe allergic conditions.	Foristal Lontabs.	Adult: PO- 1-2 mg 3 times/day. Topical As 0.1% gel/lotion. It comes as a tablet to take by mouth, with food. It also comes as a gel to apply topically.	Caution should be exercised in patients with history of elderly, increased eye pressure, prostate enlargement, epilepsy, stomach obstruction, during pregnancy and breastfeeding.
Diphenhydramine	For severe allergic conditions such as runny nose, sneezing, itchy and watery eyes. It is also used for itching of insect bites, sunburns, bee stings, poison ivy, poison oak and minor skin irritation.	Expectorant Vencof   Calacare (50 ml)   Nbdryl (100 ml) Becodryl	PO- Adult- The recommended dose is 25 mg to 50 mg (1 to 2 capsules). Child- The recommended dose is 12.5 mg to 25 mg (1 capsule). Topical: Apply a thin layer over the affected area as directed by your physician.	It may cause dizziness or drowsiness, do not drive a car or operate machinery while taking this medication. Avoid alcohol consumption.
Embramine	It is an antihistamine and anticholinergic, prescribed for severe allergic conditions.	Mebryl	PO- The recommended dose is 25mg, every 4 to 6 hours. Max: 150mg	Avoid alcohol consumption while taking this medication
Fexofenadine	This medication is an antihistamine, prescribed for seasonal allergic reactions such as runny nose, sneezing, red, itchy, or watery eyes; itching. It blocks histamine's action, which reduces allergy symptoms.	Alfexo   Allegra (180 mg)   Alert (180 mg)   Fexo (180 mg) Fexoquit	Adults: The recommended dose is 60 mg twice daily or 180 mg once daily with water. Children 6 to 11 Years: The recommended dose is 30 mg twice daily with water.	Extreme caution needed in children less than 6 months old. It may cause dizziness, do not drive a car or operate machinery while taking this medication.

**Smart Dust: Knowledge Analysis of Environmental Allergens and Pollutants in Delhi through Millimetre Motes - using Data Mining**

Flunisolide	This medication is a corticosteroid, prescribed for asthma and allergic rhinitis. It arrests the release of chemicals in the body that cause inflammation.	Synatris	The recommended starting dose is 2 sprays (58 mcg) in each nostril 2 times a day (total dose 232 mcg/day).	Caution should be exercised in patients with history of tuberculosis (TB), fungal or bacterial infections, liver, kidney, intestinal or heart disease, diabetes, decrease in thyroid hormone, osteoporosis, high blood pressure, mental illness, autoimmune neuromuscular disease, inflammation in joints, eye infection, epilepsy and ulcer, during pregnancy.
Ketotifen	This medication is an antihistamine, prescribed for asthma, allergic conjunctivitis and other allergic conditions. It blocks histamine a substance in the body that causes allergic symptoms.	Stafen , Airfyen , ketorid	Adult: PO- Asthma prophylaxis; Allergic conditions- 1 mg twice daily, up to 2 mg twice daily if needed.	It may cause dizziness or drowsiness, do not drive a car or operate machinery while taking this medication.
Loratadine	This medication is an antihistamine, prescribed for allergic conditions. It blocks histamine action, which reduces allergy symptoms.	klodin , lorodin(30 ml ) , prodin	Po- Adults: 10 mg daily as a single dose. Children: <30kg- 5 mg once a day; > 30 kg: 10 mg once a day.	Caution should be exercised in patients with liver or kidney disease, and epilepsy.
Mizolastine	This medication is a non-sedating antihistamine, prescribed for symptoms of hay fever (seasonal allergic rhinitis), hives and other allergic reactions.	Elina , Zehist	Adult: Oral- The recommended dose is 10 mg/day as a single tablet.	It may cause dizziness or drowsiness, do not drive a car or operate machinery while taking this medication. Caution should be exercised in patients with history of liver, heart, kidney problems, irregular heartbeat, blood disorder, low potassium levels, diabetes, elderly, any allergy, during pregnancy and breastfeeding.
Pseudoephedrine	This medication is a decongestant, prescribed for cold, allergic rhinitis and hay fever. It relieves stuffy nose, opens nasal airways and drains sinuses.	XI-80 , Qril , sinact ( 60ml)	Adult: PO- As HCl or sulfate: 60 mg 4-6 hourly. Max: 4-doses/24 hour. Extended release 120 mg 12 hourly or 240 mg 24 hourly.	Do not take appetite control medicines while taking this medication.
Xylometazoline	This medication is a decongestant, used to relieve nasal and sinus congestion due to colds, allergies, and hay fever. Ophthalmic- Relieving redness in eyes. It works by constricting the blood vessels in the nose.	cyper-P , nozin , nascal , flurex 0.5	Instill into each nostril- 2-3 times/day. Max duration: 5 days.	Do not use this nasal preparation for longer than 3 to 5 days. Rebound congestion may occur after prolonged regular use
Antihistamines	It blocks histamine action , which reduces allergy symptoms	Benadryl , claritin , allegra , Zyrtec		

Some nasal steroids	Spray into your nose as it relieve congestion, runny nose, sneezing, itchy nose, and other symptoms.	Beconase (beclomethasone) Flonase (fluticasone) Nasacort Nasalide Omnaris Rhinocort		
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### XVII. HOSPITAL AND CHEMIST DETAILS

Different areas have different chemist and pharmacy shops providing customers with even 24X7 services. The list below shows the nearby chemist along with their other details for all four areas been examined to identify the allergens and their affects on people.

AREA	CHEMIST NAME	LOCATION	PHONE NO:-
<b>R.K.Puram</b>	Apollo pharmacy	Shop No-21, Ground Floor, Main Market, Opposite Water Tank, RK Puram Sector 8, Delhi	91 -11-66362693
	Dinesh medicos	Shop No-1, Sec-1, Mkt, R K Puram, Delhi – 110022	9811051160
	S S Medpoint	Shop No 13, Sec-3, Nr Chawla Book Depot, R K Puram, Delhi – 110022	91-11-26165659
	Guardian pharmacy	Shop No-24, Sec-4, R K Puram, Delhi - 110022	011 26104390
	Viva chemist	Shop No-24, Nr Central Govt School, R K Puram, Delhi – 110022	011 26178183
	Jain bros chemist	Shop no-3, Back side of mother dairy, Sec-6, Main market, RK Puram Sector 6, Delhi – 110022	011 26195080
	Aggarwal chemist	Shop No-2, Sector-1 Market, R K Puram, Delhi – 110022	9311099817
<b>Punjabi bagh</b>	Kunal medicos	D-1, Mohan Singh market, RK Puram Sector 6, Delhi – 110022	9717232581
	Apolo pharmacy	Shop No 2,1/45 A, Near West Punjabi Bagh & Near IDBI Bank, CENTRAL MATKET , Punjabi Bagh West, Delhi – 110026	9268200340
	Guardian pharmacy	1/45a, Near Central Marketing, Punjabi Bagh West, Delhi – 110026	9999996690
	Ladlii jee chemist	17A/35, Near Maharaja Agrasen Hospital, Main Rohtak Road, Punjabi Bagh West, Delhi – 110026	9811534864
	Jindal chemist	Shop No-2/53, Near Red Light, Punjabi Bagh West, Delhi – 110026	9971774643
	Sai medicos	Shop No. 1, Near Shiv Mandir, Shiv Mandir Marg, Punjabi Bagh West, Delhi – 110026	011 66265777
	Shri balaji chemist	Shop no. 17A/35, Rohtak Road, Near Maharaja Agrasen Hospital, Punjabi Bagh West, Delhi – 110026	9873432320
	Deepak medical store	A-234, Near madipur metro station, Madhi Pur Colony, Madipur, Delhi – 110063	9654443409
	Arihant medicos	Shop Number- 27 Csc, Pocket- A/4, Dda Market, Near Metro Station, Dda Market, Paschim Vihar, Delhi – 110063	9899167448
	98.4 medicos	Shop Number 35, Central Market Panjabi Bagh, Main Mkt Road, Punjabi Bagh, Delhi - 110026	85888899331
	Viva medicos	Shop No 3, P No. 2/81, West Punjabi Bagh, Main Club Rd, Punjabi Bagh, Delhi – 110026	011 47180000
	<b>Anand Vihar</b>	United chemist	2/80 B, Opposite Ramchand Memorial Nursing Home, Nwa Club Road, Punjabi Bagh, Delhi – 110026
Amit medical store		Wz-247, Nr Shiv Mandir, Madipur Village, Madipur, Delhi – 110063	9971464899
Kumar medicos		S No 21, G H-13, Dda Mkt, Paschim Vihar, Delhi – 110063	011 66433923
Khaneja chemist		S No-G-4, Ashish Cplx, Near mother dairy, Keventer, Surajmal Vihar-Anand Vihar, Delhi – 110092	9871818950

	Kalra chemist	Sno- 17, Csc Mkt, A-Blk, Anand Vihar, Delhi – 110092	011 22162897
	Relief pharmacy	G-2, Keventar Market, Ashish Complx, Surajmal Vihar-Anand Vihar, Delhi – 110092	9654533277
	Ram raj medicos	Shop No 36, Csc 1, Dda Market, Near St Andrew School, Indraprastha Extension, Delhi – 110092	011 66363865
	Shiva homeo pharmacy	Flat No 103, 1st Floor, Aggarwal Complex, Surajmal Vihar-Anand Vihar, Delhi – 110092	011 66358560
	Deep medicos	Shop no. -14 & 16, A block market, Anand Vihar, Delhi – 110092	9910688323
	Shiva homeo pharmacy	103, First Floor, Aggarwal Complex, Near Yamuna Sports Complex, A-Block, Surajmal Vihar-Anand Vihar, Delhi – 110092	9250964466
	Mina medicos	G-1,Aditya Corporation Plaza, Opposite Dyanand Vihar, Karkardooma community centre, Karkardooma, Delhi – 110092	9718302449
	Sudhanshu medical store	Inder Enclave-2, Near Vijay Dharam Kanta, Main Mubarak Pur Road, Kiran Vihar-Anand Vihar, Delhi – 110092	9971609984
	Apollo pharmacy	S No-F-3/17, Grd Flr, Near Ashok Nursing Home, Krishna Nagar, Delhi – 110051	9899286303
	Lovely medicos	G-2/15,Manish Chamber, Saini Enclave, Near Karkardooma Metro Station, Karkardooma, Delhi – 110092	1166442396
<b>IGI Airport</b>	Srs medicos	Shop No 25, Vardhman Plus Citi Mall, Opp Basava International School, Dwarka Sector 23, Delhi – 110077	9910834595
	Goyal medical store	19, Nehru Market, Gurgaon Rd, Delhi - 110037	011 23277378
	Rai medico	Mahavir Encalve, Main Rd, Palam Colony, Delhi – 110045	011 25030015
	Sheetla medical store	Opp Obc Bank, Vasant Kunj Road, Mahipalpur, Delhi – 110037	9718441792
	Kunj pharmacy	main vasant kunj road , mahipalpur	011 32561115
	Keneeth chemist	K-26 , near aggarwal sweets , mahipalpur	011 41686953
	Guardian pharmacy	F-13 qutub plaza ,, DLf phase-1 , gurgaon road	0124 3261519
	Ayshman medicos	G-16, P No-2 HI Galleria, H L Galeeryia,Sec -12, Bellow Ayunshmaan Hospital, Main Road, Dwarka Sector 12, Delhi – 110078	9910116124
	M G pharmacy	Shop No 3, Plot No 56, Near Dwarka MOD, Dwarka, Delhi – 110075	7838832952
	Gaur medical store	Sector 22, Main Road Noida, Main Road, Delhi Cantt, Delhi – 110010	011 25359702
	Varshi medicos	K-577 opposite MCD primary school , mahipalpur	9810655453
	Gupta medical store	L-1 near reliance fresh , mahipalpur	011 41687221
	Guardian pharmacy	D-01, Domestic Departure, Terminal- 3, Igi Airport, Delhi – 110037	9718985891

### XVIII. PERSONEL MEDICAL HISTORY

Medical history of 50 people were collected with the help of questionnaire as a tool , and to provide a glimpse of how people get affected from allergies according to their body composition, previous medical history, sensitiveness to allergens and daily habits, we listed down the following results of 10 people been surveyed. The following attributes were taken into consideration while taking the health history of people and how they worsen the affect of allergies is also been listed:



NAME	WEIGHT	AGE	GENDER	SMOKER	ASTHMA PATIENT	SEASONAL ALLERGIC	PERENNIAL ALLERGIC	ALLERGIC LEVEL
Ms. Sonia Garg	63kg	22	F	NO	NO	YES	YES	HIGH
Mr. Akshay Tripathi	72Kg	25	M	NO	NO	YES	YES	HIGH
Mr. Anil Mehta	69Kg	68	M	YES	YES	YES	YES	HIGH
Ms. Rashmi Singh	82Kg	36	F	NO	YES	NO	NO	LOW
Ms. Suhani Kashyap	42Kg	18	F	NO	NO	YES	YES	LOW
Mr. Rajeev Mehra	85kg	62	M	NO	YES	YES	YES	HIGH
Mr. Karan Singh	77Kg	26	M	YES	YES	NO	NO	LOW
Mr. Ashok Chawla	76Kg	30	M	YES	YES	NO	YES	MILD
Ms. Priya Kaur	86Kg	50	F	NO	NO	YES	NO	MILD
Ms. Sonam Khatri	70Kg	41	F	NO	NO	YES	NO	MILD

### XIX. ANALYSIS USING SQL

SQL (Structured Query Language) is a computer language for working with sets of facts and the relationships between them. The first incarnation of SQL appeared in 1974, when a group in IBM developed the first prototype of a relational database. The primary function of SQL is the management and manipulation of data and thus, basically called as data centric language. SQL includes built-in processing primitives for accessing data stored in sets, tables, lists, and other data structures and databases, and for specific manipulation and transformation of data required by a programming application.

### XX. RESULTS AFTER ANALYSIS:-

The following questions were taken as an example to find out the actual analysis using SQL Queries.

1. Which area faces the maximum air quality misbalance?

```
SQLQuery1.sql ...dust (sa (54))*
select MAX([LOCATION]) "area faces the maximum air quality misbalance" FROM air_quality where [AIR_ALLERGIC]='yes' ;
```

RESULT:-

Results	Messages
1	area faces the maximum air quality misbalance R.K PURAM

2. Which area faces the minimum air quality misbalance?

```
SQLQuery1.sql ...dust (sa (54))*
select MIN([LOCATION]) "area faces the minimum air quality misbalance" FROM air_quality where [AIR_ALLERGIC]='yes' ;
```

RESULT:-

Results	
area faces the minimum air quality misbalance	
1	ANAND VIHAR

3. Which area faces the maximum pollen affect?

```
SQLQuery1.sql ...dust (sa (54))*
select MAX([LOCATION]) "area faces the MAXIMUM POLLEN COUNT misbalance" FROM [pollen count] where [POLLEN_ALLERGIC]='yes' ;
```

RESULT:-

Results	
area faces the MAXIMUM POLLEN COUNT misbalance	
1	PUNJABI BAGH

4. Which area faces the minimum pollen affect?

```
SQLQuery1.sql ...dust (sa (54))*
select MIN([LOCATION]) "area faces the MINIMUM POLLEN COUNT misbalance" FROM [pollen count] where [POLLEN_ALLERGIC]='yes' ;
```

RESULT:-

Results	
area faces the MINIMUM POLLEN COUNT misbalance	
1	ANAND VIHAR

5. Which area is highly affected by tree type pollen in Delhi?

```
SQLQuery1.sql ...dust (sa (54))*
select [LOCATION] "area is highly affected by tree type pollen in Delhi" FROM [pollen count]
where [POLLEN_ALLERGIC]='yes' and Trees >=6 group by LOCATION ;
```

RESULT:-

Results	
area is highly affected by tree type pollen in Delhi	
1	ANAND VIHAR
2	PUNJABI BAGH

6. What is % pollen count of the highly affected part of Delhi?

```
SQLQuery1.sql ...dust (sa (54))*
select ROUND((COUNT([ALLERGY LEVEL])*100)/32,2) "% pollen count of the highly affected part of Delhi"
from [pollen count] where [ALLERGY LEVEL]='High';
```

RESULT:-

Results	
% pollen count of the highly affected part of Delhi	
1	46

7. What % of city is affected by weed pollen type?

```
SQLQuery1.sql ...dust (sa (54))*
select ROUND((COUNT([LOCATION]) *100)/32,2) "% of city is affected by weed pollen type"
from [pollen count] where [ALLERGY LEVEL]='High' and Weeds>=6;
```

RESULT:-

	% pollen count of the highly affected part of Delhi by Weeds
1	40

8. Which area is highly prone to allergies in Delhi?

```
SQLQuery1.sql ...dust (sa (54))*
select air_quality.LOCATION "air_quality location", [pollen count].LOCATION "pollen count location"
from [pollen count], air_quality
where air_quality.[AIR_ALLERGIC]='yes' and [pollen count].[ALLERGY LEVEL]='high'
group by [pollen count].LOCATION, air_quality.LOCATION;
```

RESULT:-

	air_quality location	pollen count location
1	ANAND VIHAR	ANAND VIHAR
2	I.G.I AIRPORT	ANAND VIHAR
3	PUNJABI BAGH	ANAND VIHAR
4	R.K PURAM	ANAND VIHAR
5	ANAND VIHAR	I.G.I AIRPORT
6	I.G.I AIRPORT	I.G.I AIRPORT
7	PUNJABI BAGH	I.G.I AIRPORT
8	R.K PURAM	I.G.I AIRPORT
9	ANAND VIHAR	PUNJABI BAGH
10	I.G.I AIRPORT	PUNJABI BAGH
11	PUNJABI BAGH	PUNJABI BAGH
12	R.K PURAM	PUNJABI BAGH

9. List of chemist shops at a particular location?

```
SQLQuery1.sql ...dust (sa (54))*
select chemistname.CHEMIST_NAME, chemistname.ADDRESS, chemistname.LOCATION from chemistname , air_quality, [pollen count]
where chemistname.LOCATION in(select air_quality.LOCATION from air_quality
where air_quality.[AIR_ALLERGIC]='yes' ) group by chemistname.CHEMIST_NAME, chemistname.ADDRESS, chemistname.LOCATION;
```

RESULT:-

CHEMIST_NAME	ADDRESS	LOCATION
1 98.4 medicos	Shop Number 35, Central Market Panjabi Bagh, Main Mkt Road, Punjabi Bagh, Delhi - 110026	Punjabi bagh
2 amit medical store	Wz-247, Nr Shiv Mandir, Madipur Village, Madipur, Delhi - 110063	Punjabi bagh
3 apollo pharmacy	S No-F-3/17, Grid Flr, Near Ashok Nursing Home, Krishna Nagar, Delhi - 110051	Anand Vihar
4 appollo pharmacy	Shop No 2,1/45 A, Near West Punjabi Bagh & Near IDBI Bank, CENTRAL MATKET , Punjabi Bagh West, Delhi - 110026	Punjabi bagh
5 arihant medicos	Shop Number- 27 Csc, Pocket- A/4, Dda Market, Near Metro Station, Dda Market, Paschim Vihar, Delhi - 110063	Punjabi bagh
6 deep medicos	Shop no. -14 & 16, A block market, Anand Vihar, Delhi - 110092	Anand Vihar
7 deepak medical store	A-234, Near madipur metro station, Madhi Pur Colony, Madipur, Delhi - 110063	Punjabi bagh
8 guardian pharmacy	1/45a, Near Central Marketing, Punjabi Bagh West, Delhi - 110026	Punjabi bagh
9 jindal chemist	Shop No-2/53, Near Red Light, Punjabi Bagh West, Delhi - 110026	Punjabi bagh
10 kalra chemist	Sno- 17, Csc Mkt, A-Blk, Anand Vihar, Delhi - 110092	Anand Vihar
11 khaneja chemist	S No-G-4, Ashish Cplx, Near mother dairy, Keventer, Surajmal Vihar-Anand Vihar, Delhi - 110092	Anand Vihar
12 kumar medicos	S No 21, G H-13, Dda Mkt, Paschim Vihar, Delhi - 110063	Punjabi bagh
13 laddi jee chemist	17A/35, Near Maharaja Agrasen Hospital, Main Rohtak Road, Punjabi Bagh West, Delhi - 110026	Punjabi bagh
14 lovely medicos	G-2/15, Manish Chamber, Saini Enclave, Near Karkardooma Metro Station, Karkardooma, Delhi - 110092	Anand Vihar
15 mina medicos	G-1, Aditya Corporation Plaza, Opposite Dyanand Vihar, Karkardooma community centre, Karkardooma, Delhi - 110092	Anand Vihar
16 Ram raj medicos	Shop No 36, Csc 1, Dda Market, Near St Andrew School, Indraprastha Extension, Delhi - 110092	Anand Vihar
17 relief pharmacy	G-2, Keventar Market, Ashish Complx, Surajmal Vihar-Anand Vihar, Delhi - 110092	Anand Vihar
18 sai medicos	Shop No. 1, Near Shiv Mandir, Shiv Mandir Marg, Punjabi Bagh West, Delhi - 110026	Punjabi bagh
19 santosh medicos	Shop No 17 Wz - 170/220 A, Madipur, Opp. Mother Dairy SFS Flats, Madipur village, Punjabi Bagh, Delhi - 110026	Punjabi bagh
20 shiva homeo pharm...	103, First Floor, Aggarwal Complex, Near Yamuna Sports Complex, A-Block, Surajmal Vihar-Anand Vihar, Delhi - 110092	Anand Vihar
21 shiva homeo pharm...	Flat No 103, 1st Floor, Aggarwal Complex, Surajmal Vihar-Anand Vihar, Delhi - 110092	Anand Vihar
22 shri balaji chemist	Shop no. 17A/35, Rohtak Road, Near Maharaja Agrasen Hospital, Punjabi Bagh West, Delhi - 110026	Punjabi bagh
23 sudhanshu medical...	Inder Enclave-2, Near Vijay Dharam Kanta, Main Mubarak Pur Road, Kiran Vihar-Anand Vihar, Delhi - 110092	Anand Vihar

10. Who all Doctors are available at R.K. PURAM?

SQLQuery1.sql - ...t dust (sa (54))

```
select doctors.DOCTER_NAME,doctors.ADDRESS,doctors.LOCATION,doctors.TIMINGS, doctors.[CONTACT INFO],doctors.LINK
from doctors where doctors.LOCATION in (select air_quality.LOCATION from air_quality where air_quality.[AIR_ALLERGIC]='yes')
)group by doctors.ADDRESS,doctors.LOCATION,doctors.DOCTER_NAME,doctors.[CONTACT INFO],doctors.LINK,doctors.TIMINGS;
```

RESULT:-

DOCTER_NAME	ADDRESS	LOCATION	TIMINGS	CONTACT INFO	LINK
MAX SUPER SPECIALITY hospital	1, Press Enclave Road, Saket, Delhi - 110017	R.K PURAM	Monday, Tuesday, Wednesday, Thursday, Friday, Sa...	011 66534955	www.maxhealthcare.com
Dr. huzuria	20,Aradhana,Sector-13, R K Puram, Delhi - 110022	R.K PURAM	Monday, Tuesday, Wednesday, Thursday, Friday, Sa...	011 24677059	NULL
Daya memorial hospital	210, Village, Near Multi Level Parking, Dr Kapoor W...	R.K PURAM	All days : 12:00 am to 11:59 pm	011 66361599	NULL
Dr. rajni ved	41, Anupam Apts, M.B. Road, Saidyallahab, New Del...	R.K PURAM	Monday, Tuesday, Wednesday, Thursday, Friday, Sa...	1126967362	NULL
Ndmc Hospital	Begam Zadi Mkt, Nr Rail Museum, Moti Bagh, Delhi ...	R.K PURAM	Monday, Tuesday, Wednesday, Thursday, Friday, Sa...	011 24679711	NULL
Sukhmani hospital	Block B7,Hospital No 126a,Extension, Opposite Arya...	R.K PURAM	Monday, Tuesday, Wednesday, Thursday, Friday, Sa...	011 66228659	http://www.sukhmanihospital.in/
Mohinder Hospital	C-5, Near Gurudwara, Green Park Extension, Green ...	R.K PURAM	Monday, Tuesday, Wednesday, Thursday, Friday, Sa...	011 66891466	www.mohinderhospital.com
Dr.Vinayek clinic	E-9/15, Opp DPS School, Vasant Vihar, Delhi - 1100...	R.K PURAM	Monday, Tuesday, Wednesday, Thursday, Friday, Sa...	011 6537264	NULL
Bsf Hospital	East Block-9, RK Puram Sector 1, Delhi - 110022	R.K PURAM	Monday, Tuesday, Wednesday, Thursday, Friday, 12...	011 26193282	NULL
Dr. M.C Rita baruha	F No-2, Cghs M&G, Hospital Campus, R K Puram, De...	R.K PURAM	NULL	9868808096	NULL
Dr. vinay walia clinic	Fc/3, First Floor, Dda Shopping Centre, Beneath Udi...	R.K PURAM	Monday, Tuesday, Wednesday, Thursday, Friday, Sa...	011 6741632	NULL
Apollo health at home	Indraprastha Apollo Hospital, Mathura Road, Sarita V...	R.K PURAM	All days: 08:00 am to 08:00 pm	011 66442511	NULL
Prem chikista Kendra	Kanak Durga Cplx, RK Puram Sector 12, Delhi - 110...	R.K PURAM	Monday, Tuesday, Wednesday, Thursday, Friday, Sa...	011 2619 5637	NULL
Safdajung Hospital	New Opd Building, Opposite Aims, Department Of O...	R.K PURAM	Monday, Tuesday, Wednesday, Thursday, Friday, Sa...	011 26165060	http://www.vmmc-sjh.nic.in/
Holly Angels Hospital	Plot No-B, Lok Commercial Central, Behind Priya Cin...	R.K PURAM	Monday, Tuesday, Wednesday, Thursday, Friday, Sa...	011 43357700	NULL
Dr. surbesh bhattacharjee	Q No-513-A, Sec-3, R K Puram, Delhi - 110022	R.K PURAM	NULL	011 26180707	NULL
Dr. virender S. salhotra	Qtr No. 294, Sector-4, R.K. Puram, New Delhi, RK P...	R.K PURAM	Monday, Tuesday, Wednesday, Thursday, Friday, Sa...	1126198545	NULL
Dr. Rajesh bhatnagar	S-3/486, R K Puram, Delhi - 110022	R.K PURAM	NULL	011 23034171	NULL
Pramila Clinic	Shop No 136, Sec-9 Mkt, R K Puram, Delhi - 110022	R.K PURAM	Monday, Tuesday, Wednesday, Thursday, Friday, Sa...	9899729456	NULL
Dr. Raj mathur	Shop No 23, Sector-1 Market, R K Puram, Delhi - 11...	R.K PURAM	Monday, Tuesday, Wednesday, Thursday, Friday, Sa...	011 26898495	NULL
Health on call	shop no-63a/1, Near Gurudwara, Arjun Nagar, Safda...	R.K PURAM	Monday, Tuesday, Wednesday, Thursday, Friday, Sa...	011 66889531	NULL

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