MySQL Workbench

Data Analysis on Grid-scope

```
create schema Gridscope;
use Gridscope;
select * from grids;
```

Sensor_ID	Timestamp	Fault_Type	Latitude	Longitude	Temperature	Wind_Speed	Pole_Health_Score	Communica
SENSOR_1	2024-05-05 18:58:51	Line Break	48.91690437	-136.200822	6.822513248	66.09639865	87	Satellite
SENSOR_2	2023-10-27 03:52:51	Line Break	30.32687284	-30.91814943	-20.40808139	118.2654837	62	Cellular
SENSOR_3	2024-04-09 14:12:51	Insulator Flashover	-25.47166336	-37.03222877	44.51236901	65.44282534	12	Satellite
SENSOR_4	2023-12-28 22:23:51	Vegetation Contact	73.24613981	-36.43098081	16.73590325	116.2204451	80	Satellite
SENSOR_5	2024-02-23 23:35:51	Lightning Strike	31.7056657	-77.49716489	-9.364068901	76.98731457	63	Device-to-D
SENSOR_6	2024-02-09 07:20:51	Vegetation Contact	-52.35475293	-100.2376107	31.89452224	113.9784021	62	Satellite
SENSOR_7	2023-10-20 05:40:51	Line Break	29.37767856	12.30400358	5.021615837	69.31915436	34	Device-to-D
SENSOR_8	2024-03-08 14:41:51	Insulator Flashover	28.68532896	130.8171737	1.567893473	93.38768636	25	Device-to-D

```
#Count of Faults by Type
select Fault_Type, count(*) as Fault_Count from grids
group by Fault_Type order by Fault_Count desc;
```

Fault_Type	Fault_Count
Line Break	1008
Insulator Flashover	1007
Vegetation Contact	1006
Lightning Strike	996
Equipment Failure	983

```
#Faults Over Time
select date(Timestamp) as  Fault_Date ,count(*) from grids as Daily_fault_count
group by Fault_Date order by Fault_Date;
```

Fault_Type	Fault_Count
Line Break	1008
Insulator Flashover	1007
Vegetation Contact	1006
Lightning Strike	996
Equipment Failure	983

```
#Top 10 Locations with Most Faults
select Latitude, Longitude, count(*) as Fault_Count from grids
group by Latitude,Longitude
order by Fault_Count desc
limit 10;
```

	Latitude	Longitude	Fault_Count
▶	48.91690437	-136.200822	1
	30.32687284	-30.91814943	1
	-25.47166336	-37.03222877	1
	73.24613981	-36.43098081	1
	31.7056657	-77.49716489	1
	-52.35475293	-100.2376107	1
	29.37767856	12.30400358	1
	28.68532896	130.8171737	1
	17.68378096	-151.4206484	1

```
#Average Environmental Conditions for Each Fault Type
select Fault_Type, Avg(Temperature) as Avg_Temnperature, Avg(Wind_speed) as Avg_speed from grids
group by Fault_type;
```

	Latitude	Longitude	Fault_Count
▶	48.91690437	-136.200822	1
	30.32687284	-30.91814943	1
	-25.47166336	-37.03222877	1
	73.24613981	-36.43098081	1
	31.7056657	-77.49716489	1
	-52.35475293	-100.2376107	1
	29.37767856	12.30400358	1
	28.68532896	130.8171737	1
	17.68378096	-151.4206484	1

```
#Fault Distribution by Communication Type
select Communication_Type, count(*) as Fault_Count from grids
group by Communication_Type
order by Fault_Count;
```

	Fault_Type	Avg_Temnperature	Avg_speed
▶	Line Break	11.33474114575101	75.71513052999902
	Insulator Flashover	10.492022974386293	75.49212347244686
	Vegetation Contact	11.164154117517873	74.44462882263718
	Lightning Strike	8.833078408993975	74.87644618232939
	Equipment Failure	9.843730016200423	76.59936771819842

```
#Average Pole Health Score by Fault Type
select Fault_Type ,avg(Pole_Health_Score) as Avg_Pole_Health_Score from grids
group by Fault_Type
order by Avg_Pole_Health_Score;
```

	Communication_Type	Fault_Count
▶	Device-to-Device	1618
	Satellite	1672
	Cellular	1710

```sql
#Faults by Time of Day
select extract(hour from Timestamp) as hour,count(*) as Fault_Count from grids
group by hour
order by hour;
```

Fault_Type	Avg_Pole_Health_Score
Vegetation Contact	48.7068
Line Break	49.3552
Equipment Failure	50.9878
Lightning Strike	51.0060
Insulator Flashover	51.0775

```sql
#Correlation Between Temperature and Wind Speed
/*select CORR(Temperature, Wind_Speed) as Temp_Wind_Speed_Corr from grids; */
```

```sql
#Faults Occurrence by Temperature Range
select case
WHEN Temperature < 0 THEN 'Below 0°C'
    WHEN Temperature BETWEEN 0 AND 10 THEN '0-10°C'
    WHEN Temperature BETWEEN 11 AND 20 THEN '11-20°C'
    WHEN Temperature BETWEEN 21 AND 30 THEN '21-30°C'
    WHEN Temperature BETWEEN 31 AND 40 THEN '31-40°C'
    ELSE 'Above 40°C'
    end as Temp_Range, count(*) as Fault_Count from grids
group by Temp_Range
order by Fault_Count desc;
```

hour	Fault_Count
0	198
1	194
2	222
3	235
4	239
5	198
6	205
7	211
8	208

```sql
#Identify High-Risk Locations Based on Fault Frequency
SELECT Latitude, Longitude, COUNT(*) AS Fault_Count
FROM grids
GROUP BY Latitude, Longitude
HAVING COUNT(*) > (SELECT AVG(Fault_Count) FROM (SELECT COUNT(*) AS Fault_Count FROM grids GROUP BY Latitude, Longit
ORDER BY Fault_Count DESC;
```

	Temp_Range	Fault_Count
▶	Below 0°C	1840
	Above 40°C	850
	0-10°C	630
	21-30°C	591
	11-20°C	545
	31-40°C	544

```sql
SELECT
  CASE
    WHEN EXTRACT(MONTH FROM Timestamp) IN (12, 1, 2) THEN 'Winter'
    WHEN EXTRACT(MONTH FROM Timestamp) IN (3, 4, 5) THEN 'Spring'
    WHEN EXTRACT(MONTH FROM Timestamp) IN (6, 7, 8) THEN 'Summer'
    ELSE 'Autumn'
  END AS Season,
  COUNT(*) AS Fault_Count
FROM grids
GROUP BY Season
ORDER BY Fault_Count DESC;
```

	Season	Fault_Count
▶	Autumn	1273
	Winter	1247
	Spring	1246
	Summer	1234

```sql
#Maximum and Minimum Pole Health Scores by Fault Type
SELECT Fault_Type,
       MAX(Pole_Health_Score) AS Max_Pole_Health_Score,
       MIN(Pole_Health_Score) AS Min_Pole_Health_Score
FROM grids
GROUP BY Fault_Type;
```

	Season	Fault_Count
▶	Autumn	1273
	Winter	1247
	Spring	1246
	Summer	1234