PROJECT REPORT

WEATHER DATA ANALYZER

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1. Abstract

*The project titled **"Data Analyzer"** focuses on developing a C-based application that reads structured data from a file and generates meaningful statistical insights. The system processes multiple attributes such as numeric values, categories, or measurement-based entries and provides functions for displaying data, computing averages, identifying minimum and maximum values, and generating simple ASCII-based charts and reports.*
This project demonstrates concepts such as structures, loops, arrays, file handling, modular approach, and console-based visualization techniques.

2. Problem Definition

Large datasets are difficult to analyze manually, especially when they contain multiple fields. Users require a simple tool that can:

- *Read dataset entries directly from a file*
- *Display records in a clean, readable format*
- *Calculate averages, totals, maximum, and minimum values*
- *Generate simple charts for comparison*
- *Export the final result to a structured report*

This project provides an easy-to-use analyzer using core C programming principles.

3. System Design

Algorithm

Step 1: Read Data from File

1. Open the input file (`data_input.txt`) in read mode
2. Skip header row
3. Read each record and store it in an array of structures
4. Close the file

Step 2: Display Data

1. Show column headers
2. Print each stored record

Step 3: Analyze Data

1. Compute averages
2. Find highest and lowest values
3. Count based conditions (if applicable)

Step 4: Generate ASCII Chart

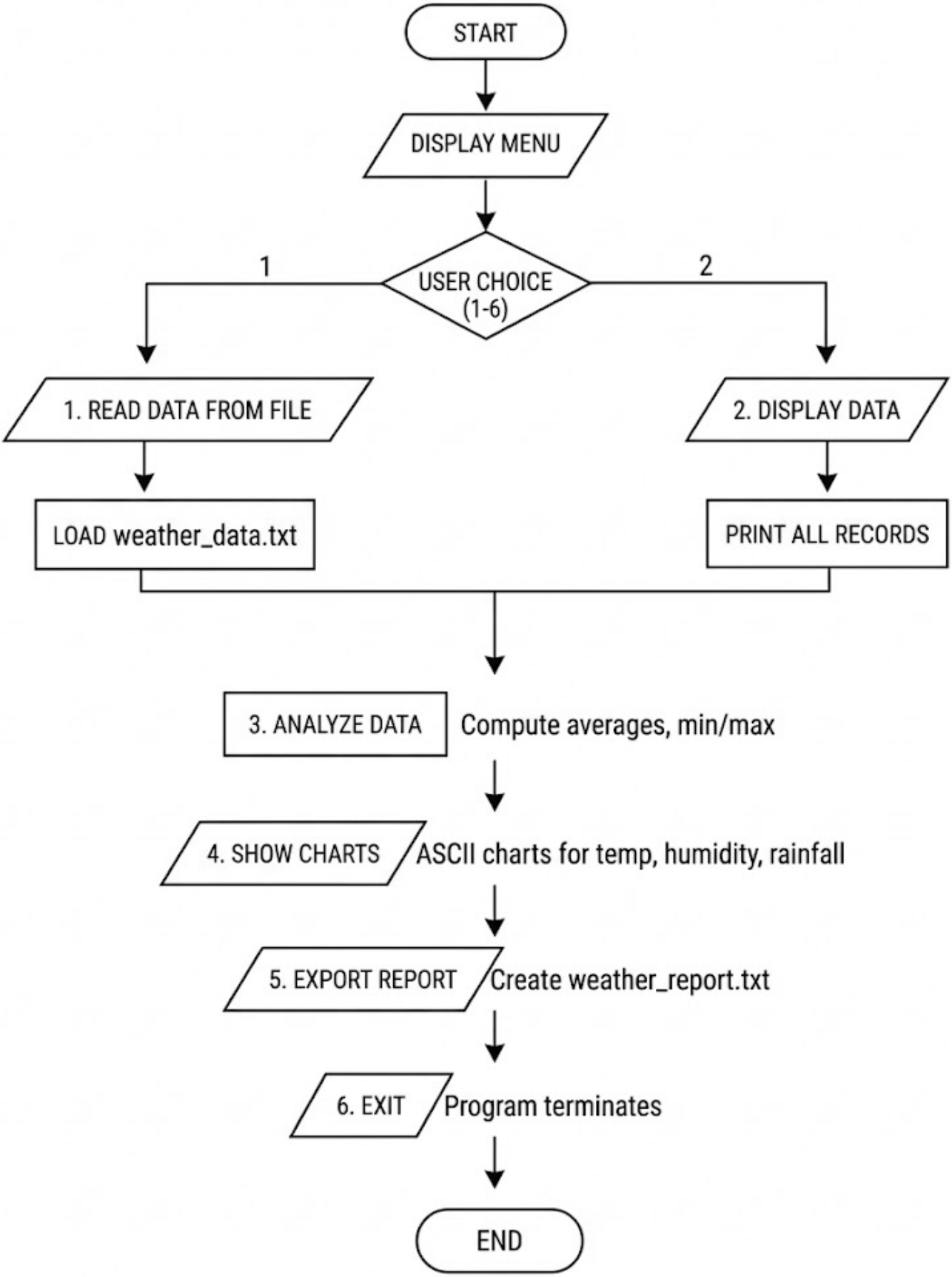
1. Print labels
2. Represent values using characters such as:
    - `*` for numeric values
    - # for percentage
    - ~ for special metrics

Step 5: Export Report

1. Write all analysis results into `data_analysis_report.txt`

Step 6: Repeat Menu Until Exit

Flow Chart


START
DISPLAY MENU
USER CHOICE (1-6)
1
2
1. READ DATA FROM FILE
LOAD weather_data.txt
2. DISPLAY DATA
PRINT ALL RECORDS
3. ANALYZE DATA
Compute averages, min/max
4. SHOW CHARTS
ASCII charts for temp, humidity, rainfall
5. EXPORT REPORT
Create weather_report.txt
6. EXIT
Program terminates
END

4. Implementation Details

Tools Used

- **Input File:** weather_data.txt
- **Output File:** weather_report.txt

Structure Definition

```
struct Data {
    char label[20];
    float value1;
    int value2;
    float value3;
};
```

Reading Data from File

```
FILE *fp = fopen("data_input.txt", "r");
 while (fscanf(fp, "%s %f %d %f",
              data[*n].label,
              &data[*n].value1,
              &data[*n].value2,
              &data[*n].value3) != EOF) {
    (*n)++;
}
```

Analysis Logic

```
for (int i = 0; i < n; i++) {
    sum1 += data[i].value1;
    sum2 += data[i].value2;
    sum3 += data[i].value3;

    if (data[i].value1 > max1) max1 = data[i].value1;
    if (data[i].value1 < min1) min1 = data[i].value1;
```

```
}
```

Report Export

```
fprintf(fp, "%s\t%.2f\t%d\t%.2f\n",
        data[i].label, data[i].value1,
        data[i].value2, data[i].value3);
```

5. Testing & Results

Sample data from the input file is read, stored, and processed to compute:

- *Average values*
- *Highest and lowest values*
- *Counts or categories*
- *ASCII charts*

The generated report includes all processed results and formatted tables.

A. Test Data from weather_data.txt

Date	Temp	Humidity	Rainfall
2025-11-01	32.5	45	0.0
2025-11-02	30.1	55	2.3
2025-11-03	28.7	60	5.6
2025-11-04	35.2	40	0.0
2025-11-05	31.8	50	1.2
2025-11-06	29.5	58	3.1
2025-11-07	27.8	62	7.4
2025-11-08	30.6	48	0.0
2025-11-09	33.2	42	0.0
2025-11-10	34.1	38	0.0
2025-11-11	31.4	52	1.8
2025-11-12	29.7	57	4.5
2025-11-13	28.3	65	8.7
2025-11-14	30.9	49	0.0

B. Display Data

------ Temperature Analysis ------

Average Temperature: 30.87 °C
Maximum Temperature: 35.20 °C (2025-11-04)
Minimum Temperature: 27.50 °C (2025-11-28)
Days Above 30°C: 19

------ Humidity Analysis ------

Average Humidity: 52.23 %
Highest Humidity: 68 % (2025-11-28)
Days With Humidity > 80%: 0

------ Rainfall Analysis ------

Total Rainfall: 92.90 mm
Average Rainfall: 3.10 mm
Highest Rainfall: 12.40 mm (2025-11-20)
Rainy Days (>5mm): 8

------ Raw Data ------

Date	Temp(C)	Humidity(%)	Rainfall(mm)
2025-11-01	32.50	45	0.00
2025-11-02	30.10	55	2.30
2025-11-03	28.70	60	5.60
2025-11-04	35.20	40	0.00
2025-11-05	31.80	50	1.20
2025-11-06	29.50	58	3.10
2025-11-07	27.80	62	7.40
2025-11-08	30.60	48	0.00
2025-11-09	33.20	42	0.00

6. Conclusion & Future Work

Conclusion

The **Data Analyzer** project successfully demonstrates structured programming, data processing, file operations, and basic data visualization. It provides a simple and efficient way to analyze structured datasets using C programming.

Future Work

- Adding graphical charts
- Supporting CSV and JSON formats
- Real-time data input
- Interactive user interface (GUI/CLI Dashboard)

7. References

C Programming tutorials and file handling references

Weather data analysis concepts

Sample weather data analysis projects and code examples