**Software Requirements Specification (SRS) for Weather Modelling System**

**1. Introduction**

**1.1 Purpose**

**The purpose of this document is to specify the requirements for a Weather Modeling System that predicts weather parameters (temperature, humidity, rainfall, and optionally wind speed) for any given hour of the day using a quadratic model. This system is intended for educational and demonstration purposes, illustrating simple weather prediction using basic mathematical models.**

**1.2 Scope**

**The system models three primary weather parameters:**

* **Temperature (°C)**
* **Humidity (%)**
* **Rainfall (mm/hr)**

**It uses three observed data points per parameter to fit a quadratic curve and predict values for any hour (0–23). Outputs are shown in both single-hour and full-day formats. The system is a standalone application designed for use in classrooms, training, or individual study.**

**1.3 Intended Audience**

* **Students of data modelling, meteorology, or computer science.**
* **Teachers or trainers demonstrating basic forecasting techniques.**
* **Hobbyists or learners exploring weather data.**

**1.4 Definitions**

* **Quadratic Model: A second-degree polynomial y=ax2+bx+c used to approximate parameter variation.**
* **Prediction: Estimated value of a parameter at a given hour based on the model.**

**2. Functional Requirements**

**2.1 Inputs**

* **Three observed data points for each weather parameter:**
  + **Hour (0–23)**
  + **Corresponding value**
* **Hour (0–23) specified by the user for prediction.**

**2.2 Outputs**

* **Coefficients of the quadratic model (a,b,c) for each parameter.**
* **Predicted temperature, humidity, rainfall (and optionally wind speed) at the specified hour.**
* **Optionally: tabulated hourly forecast for all 24 hours.**

**2.3 User Interaction**

* **User enters three data points per parameter.**
* **User enters the hour for which prediction is desired.**
* **User chooses whether to see a full-day forecast.**

**3. Non-Functional Requirements**

**3.1 Accuracy**

**Predictions are approximate and acceptable within:**

* **Temperature: pm2–3 °C**
* **Humidity: pm5–10 %**
* **Rainfall: pm1–2 mm/hr**
* **Wind Speed: pm3–5 km/h**

**3.2 Constraints**

* **Only quadratic models are supported.**
* **Requires exactly three data points per parameter.**
* **Data must be realistic and within physical limits.**

**3.3 Performance**

* **Predictions must be generated instantly (within <1s).**

**4. System Features**

| **Feature** | **Description** |
| --- | --- |
| **Input Data Capture** | **Accepts user-entered or file-based data points** |
| **Model Computation** | **Solves a system of equations to compute a,b,c** |
| **Single-Hour Prediction** | **Predicts parameters at the user-selected hour** |
| **Hourly Forecast** | **Optional table of predictions for 0–23 hours** |
| **Output Formats** | **Console display, optional file export, optional plots** |

**5. Output Format**

**5.1 Single-Hour Output**

**Predicted Weather at 16:00**

**---------------------------**

**Temperature : 30.72 °C**

**Humidity : 55.40 %**

**Rainfall : 1.25 mm/hr**

**5.2 Hourly Forecast Table**

**Hour Temp(°C) Humidity(%) Rainfall(mm/hr)**

**00 18.50 80.00 0.00**

**01 17.80 82.50 0.00**

**...**

**23 19.00 78.00 0.00**

**6. Assumptions and Dependencies**

* **Users will provide valid and representative input data.**
* **System runs on Python 3 with numpy and optional pandas/matplotlib.**
* **Terminal or notebook environment supports Unicode characters for symbols.**

**7. Future Enhancements**

* **Support for higher-order models.**
* **Support for real-time data from APIs.**
* **GUI-based interface.**
* **Export of results to .csv or .xlsx.**
* **Plots of parameter trends over time.**

**8. References**

* **OpenWeatherMap API (optional for live data).**
* **Meteorological parameter definitions from WMO (World Meteorological Organization).**

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**Prepared by: [Your Name]**

**Date: [Insert Date]**

**Approved by: [Instructor / Supervisor]**