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In partial fulfillment of the course

In CEPARCO S11

Data-level Parallelism Integrating Project Update (Milestone 2):

MOVEMENT RECOGNITION IN SIMT

Group No. 5

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PROJECT OVERVIEW

For this particular milestone, we will focus on the R-squared regression statistic to evaluate the relationship between one axis and the other two.

$$R^2 = 1 - \frac{\Sigma(\widehat{y_i} - \bar{y})^2}{\Sigma(y_i - \bar{y})^2}$$

The R-squared value is calculated as the sum of the squares of the predicted values minus the mean, divided by the sum of the squares of the actual values minus the mean. R-squared values range from 0 to 1, where values closer to 1 indicate a better fit of the model to the data.

PROGRESS AND ACCOMPLISHMENTS

I. Data Generation and Preprocessing

- *Simulated Accelerometer Data*: Generated synthetic accelerometer data for X, Y, and Z coordinates for initial testing and model development.
    - Initial input validation and preparation for data processing.
    - Implemented a loop to validate input format and ensure data integrity.
    - Outcome: Successfully validated and prepared input for further processing.

II. Multiple Linear Regression Implementation

- Current Implementation of basic input handling and logic flow.
    - Utilized standard input functions to manage user input and basic control flow structures.
    - Developed foundational logic for handling user input and setting up initial processing parameters.
- CODE PROGRESS:
    - Step 1: Input Validation Loop

        - Implemented a loop to validate the input format, ensuring it starts and ends with square brackets [ ].
        - Checked for alphabetic characters within the input to maintain data integrity.
    - Step 2: Number of Sets Input
        - Prompted the user to input the number of sets to group together for analysis.
        - Stored the input value in numSets for further processing.
    - Next Steps:
        - Develop logic to process the input data (inputArr) based on the specified number of sets (numSets).
        - Implement algorithms for data segmentation and analysis, paving the way for future integration with CUDA for enhanced parallel processing capabilities

III. R-Squared Calculation

- Current Implementation: Setup of the basic framework for handling user input and defining processing parameters.
    - Used basic input/output functions (printf, fgets, scanf) to interact with the user and manage input data.
    - Established initial structure for handling input validation and setting up processing parameters.

IV. Code Testing and Verification

- Testing Environment: Conducted initial tests in Google Colab to verify code functionality and performance for the input array.

- Details: Coded input retrieval from the user to obtain the input array and the number of sets to the group.
- Outcome: The code performed well in the Colab environment but still lacks certain checks to ensure the data will be processed correctly to prepare for CUDA in the next milestone.

NEXT AND FINAL IMPLEMENTATIONS OF THE PROJECT

V. Parallelization Using CUDA

VI. Trend Analysis Implementation

VII. Comprehensive Testing and Validation