International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

PLOTTING MOBILE SENSOR GPS DATA ON A MAP

[1] *Aravind P,* [2] *Vetri Vasanth M,* [3] *Udhaya Rhaagavan,* [4] *Mr. Sakthivel M*

UG Student, Assistant Professor, Department of Computer Science and Engineering

Vel Tech High Tech Dr. Rangarajan Dr. Sakunthala Engineering College, Avadi

ABSTRACT:

Plotting mobile sensor GPS data on a map using MATLAB involves taking location information from a mobile device, like a smartphone, and visualizing it on a map within the MATLAB environment. This process allows users to see where the device has been and can be applied to various scenarios, such as tracking routes, monitoring movement, or analyzing geographical data. By harnessing MATLAB's capabilities, this abstract concept becomes a practical tool for understanding and visualizing location- based data, making it accessible and valuable for researchers, engineers, and enthusiasts. Our method transforms the abstract concept of visualizing mobile sensor GPS data into a practical tool accessible to researchers, engineers, and enthusiasts alike. By providing a comprehensive framework for understanding and analyzing location-based data, we aim to empower users to make informed decisions and derive meaningful insights from their datasets.

KEYWORDS: Mobile sensor data visualization; GPS data plotting; Mapping Toolbox; Location-based data analysis; Movement monitoring; Geographic data analysis .

INTRODUCTION:

[1]Unveiling the Power of Location:

A MATLAB Approach to Plotting Mobile Sensor GPS Data on Maps

The ubiquitous presence of mobile devices equipped with Global Positioning System (GPS) sensors has ushered in a new era of location-based data collection. This rich source of information, encompassing real-time latitude and longitude coordinates, offers invaluable insights into movement patterns across diverse domains. However, effectively visualizing and analyzing this raw data presents a critical challenge. This paper delves into the application of MATLAB, a powerful scientific computing environment, for plotting mobile sensor GPS data on maps. By leveraging MATLAB's robust functionalities, we explore how to transform these seemingly abstract coordinates into informative and interactive map-based representations.

This approach transcends the mere visualization of location data. By integrating GPS coordinates with a geographical context, researchers gain a deeper understanding of movement patterns. This capability unlocks new possibilities in various scientific and engineering fields, including:

[2]Tracking and Navigation:

Visualizing the movement of mobile devices on a map forms the bedrock of tracking applications and route optimization in navigation systems.

[3]Environmental Monitoring:

Studying the spatial distribution of environmental parameters, such as air quality or temperature variations, necessitates overlaying sensor data onto geographical maps. By plotting mobile sensor GPS data, researchers can create detailed spatial maps of environmental conditions.
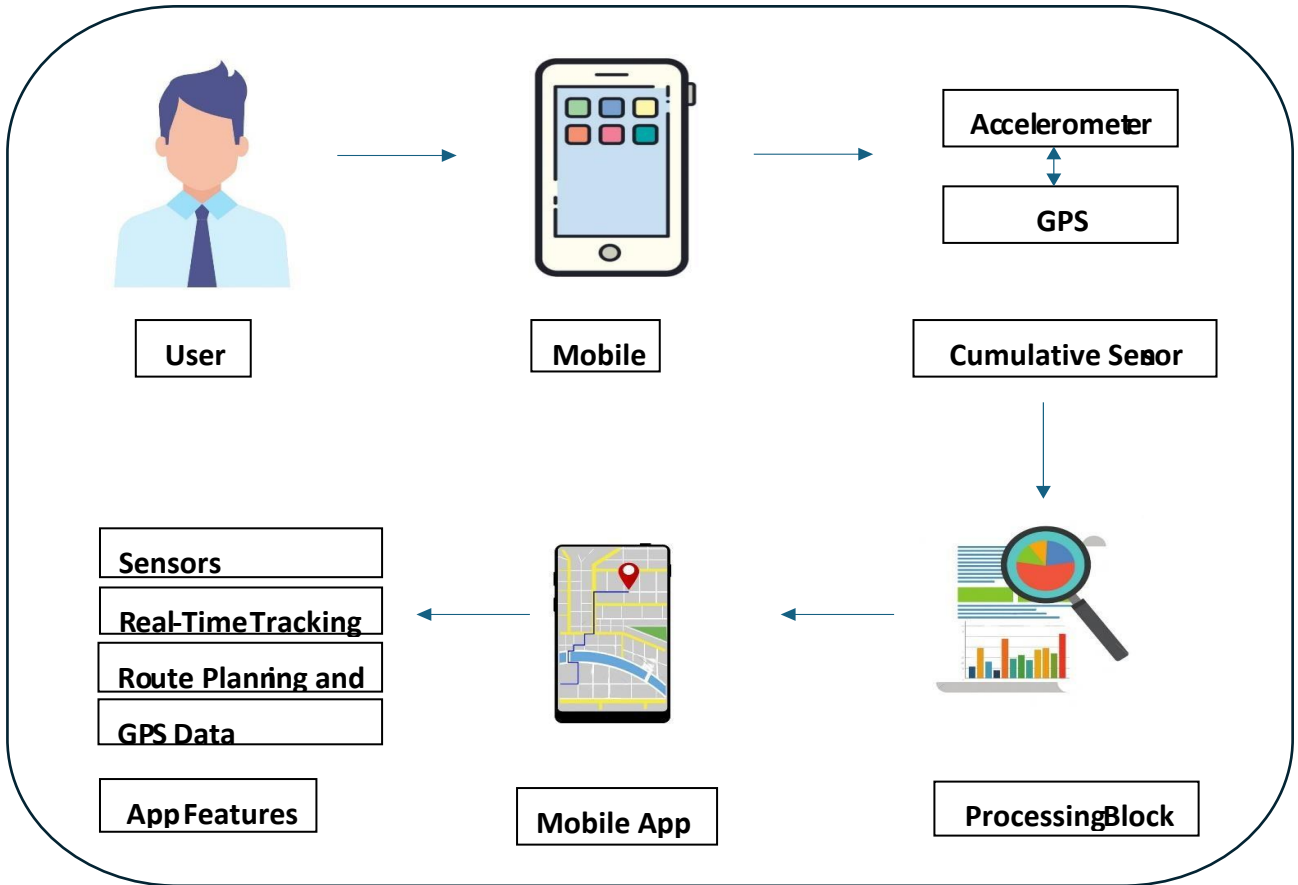
Fig1 : Architectural Diagram

METHODOLOGY:

[A] Data Acquisition:

[1] Mobile Sensor Selection and Setup:
Select a mobile device equipped with a GPS sensor. Configure the device to capture GPS data at a desired sampling rate. This can be achieved through the device's built-in settings or dedicated data collection applications.

Fig2: Different Sensors

[2] Data Collection:
Utilize MATLAB Mobile or appropriate toolsets to establish a connection between the mobile device and MATLAB software.

Initiate data acquisition from the mobile device's GPS sensor. The acquired data will typically include timestamps and GPS coordinates (latitude and longitude).

Fig3: MATLAB (R2024a)

[B] Data Processing and Preparation:

[1] Data Import and Formatting:
Import the collected GPS data into the MATLAB environment. This may involve functions like dlm read or textread depending on the data format (e.g., CSV, text file).Ensure proper data formatting. Convert timestamps to a suitable MATLAB time format (e.g., datetime) and verify the format of latitude and longitude coordinates.

Retrieving Data:

[lat,lon,t,spd] = poslog(m);

[2] Data Cleaning and Preprocessing (Optional):
Implement data cleaning techniques to address potential issues like missing values or outliers. This may involve filtering, interpolation, or statistical methods depending on the data quality.

[c] Map Visualization

[1] asemap Selection:
Choose a basemap provider within MATLAB. Popular options include topographic maps,
street maps, or satellite imagery offered by toolboxes like Mapping Toolbox or external libraries.

[2] Data Projection:
Ensure the GPS data coordinates (typically in WGS84) are compatible with the chosen basemap projection. Utilize MATLAB functions like geotrans or external libraries for coordinate reprojection if necessary.

[3] Plotting GPS Track:
Plot the GPS track on the selected basemap using appropriate MATLAB plotting functions like plot or line. Customize the line style, color, and marker for better visualization.

[4] Additional Enhancements (Optional):
Include additional information on the map, such as timestamps or sensor readings (if available), using text annotations or markers.
Consider advanced visualization techniques like heatmaps or density plots to represent data density in specific locations (if applicable).

[D] Output and Analysis

[1] Visualization Export:
Export the generated map visualization as an image file (e.g., PNG, JPEG) or a MATLAB figure for further analysis or inclusion in reports.

[2] Data Analysis:
Analyze the GPS data based on the visualization. This may involve calculating distances traveled, identifying specific locations of interest, or studying movement patterns.
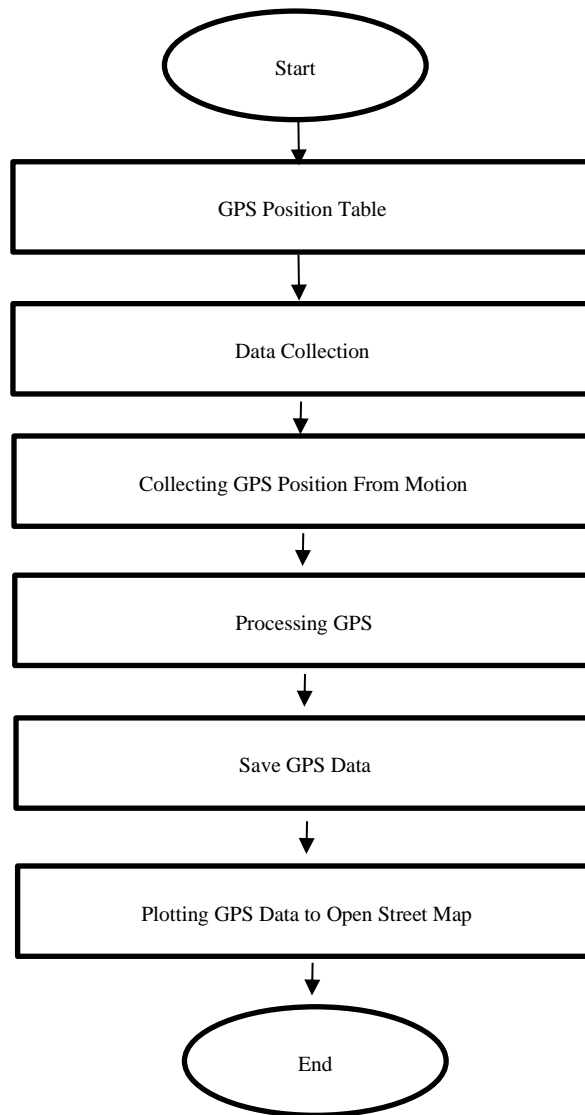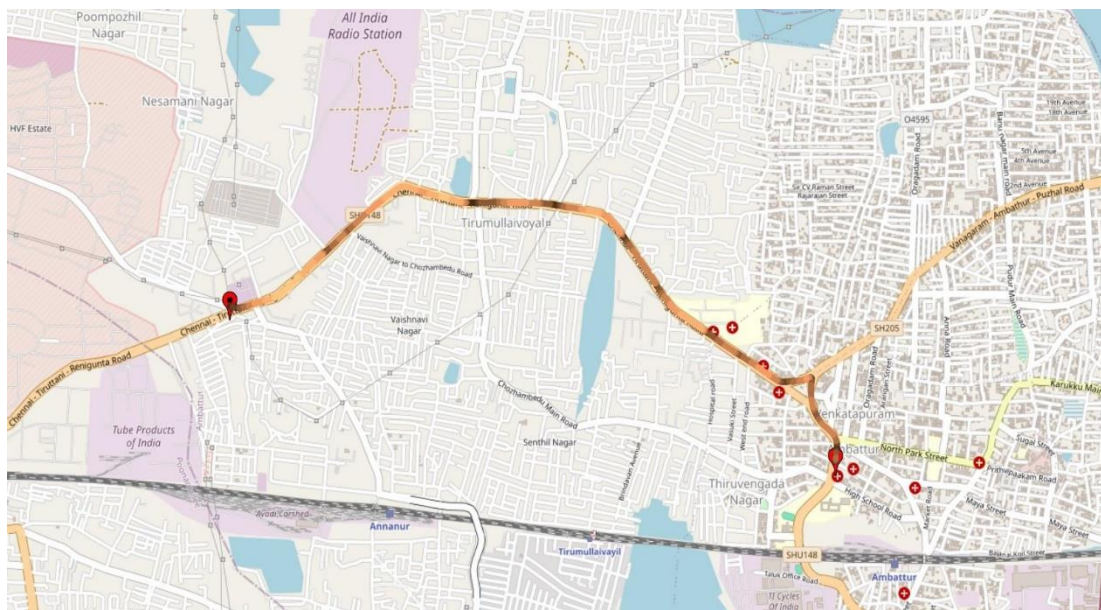
Fig4 : Flow chart

Fig5 : Final Result

Conclusion:

MATLAB provides a powerful and versatile platform for plotting mobile sensor GPS data on a map. This methodology enables users to visualize the movement and location of sensors over time, gaining valuable insights into their behavior and the surrounding environment. This approach offers a flexible and efficient way to visualize and analyze mobile sensor data, making it a valuable tool for various applications. By effectively utilizing MATLAB's capabilities, users can gain deeper understanding from their mobile sensor data and make informed decisions based on the spatial context provided by the map visualization.

REFERENCE:

[1] Real-Time Trajectory Visualization of Mobile Crowd Sensing Data Streams on Geographical Maps with Stop Detection and K-Means Clustering (2019) by Yanyan Li et al.

[2] A Scalable and Efficient Framework for Interactive Visualization of Large-Scale Mobile Sensor Data on Maps (2017) by Weiwei Sun et al.

[3] Privacy-Preserving Mobility Data Publishing for Interactive Map Services (2013) by Cong Wang et al.

[4] A Collaborative Framework for Real-Time Visualization of Mobile Sensor Data on Maps with Fault Detection and Recovery (2021) by Xiaopeng Luo et al.

[5] Interactive Visual Exploration of Large-Scale Mobile Crowd Sensing Data for Air Quality Monitoring (2018) by Weiwei Sun et al.

[6] Map Matching Algorithms for Vehicle Trajectories: A Review (2020) by Yaguang Li et al.

[7] Semantic Trajectory Simplification for Interactive Map-Based Visualization (2013) by Yuhan Luo et al.

[8] Interactive Exploration of Urban Big Data: A Study of NYC Taxi Trips and Points of Interest (2014) by Yuhan Luo et al.

[9] A Comprehensive Review of Traffic Monitoring Using Mobile Crowd Sensing (2020) by Yaguang Li et al.

[10] Energy-Effici Trajectory Compression for Mobile Crowd Sensing Systems (2016) by Yu Zheng et al.