DETECTING PICKPOCKET SUSPECTS FROM LARGE SCALE PUBLIC TRANSIT RECORDS

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ABSTRACT

Massive data collected by automated fare collection (AFC) systems provide opportunities for studying both personal traveling behaviors and collective mobility patterns in urban areas. Existing studies on AFC data have primarily focused on identifying passengers' movement patterns. However, we creatively leveraged such data for identifying pickpocket suspects. Stopping pickpockets in the public transit system has been crucial for improving passenger satisfaction and public safety. Nonetheless, in practice, it is challenging to discern thieves from regular passengers. In this paper, we developed a suspect detection and surveillance system, which can identify pickpocket suspects based on their daily transit records. Specifically, we first extracted a number of useful features from each passenger's daily activities in the transit system. Then, we took a two-step approach that exploits the strengths of

unsupervised outlier detection and supervised classification models to identify thieves, who typically exhibit abnormal traveling behaviors. Experimental results demonstrated the effectiveness of our method. We also developed a prototype system for potential uses by security personnel.

1 INTRODUCTION

Public transit passengers can easily become distracted in crowded environments, where they are often rushing from one location to another. Having their focus drift from their belongings, they often become common targets of pickpockets [1, 2]. During the first 9 months of 2014, it was reported that 350 pickpockets were apprehended in the subway system and 490 on buses in Beijing.1 Many other big cities around the world, such as Barcelona, Rome, and Paris, also suffer from pickpocket problems.2 Indeed, it is challenging to detect theft activities committed by cunning thieves who know how to escape without being discovered. It is critical to provide a smart surveillance and tracking tool for transit system security personnel.

Literature Survey

Detecting pickpocketing incidents from large-scale public transit records involves utilizing various data-driven techniques and methodologies. Here's a structured literature survey and approach outline:

1. Data Collection and Preprocessing

- **Sources**: Transit records include data from fare collection systems, surveillance cameras, passenger reports, etc.
- **Preprocessing**: Cleaning data, timestamp normalization, spatial-temporal data alignment.

2. Feature Extraction

- **Spatial Features**: Geographical location, station density, routes.
- **Temporal Features**: Time of day, day of the week, seasonality.
- **Behavioral Features**: Anomalous behavior patterns (e.g., frequent changes in direction or speed).
- **Contextual Features**: Weather conditions, special events, holidays.

3 IMPLEMENTATION STUDY

EXISTING SYSTEM:

The System of existing literature focuses on finding patterns in passenger activity records. Such knowledge can be useful in a variety of applications, and plays a vital role in effectively finding and satisfying passenger needs. Examples include assessing the performance of the transit network, identifying and optimizing problematic or flawed bus routes, improving the accuracy of passenger flow forecasted between two regions, and making service adjustments that accommodate variations in ridership on different days. In particular, [4] estimated the crowdedness of various stations in the transportation network using AFC data. [9] measured the variability of transit behaviors on different days of the week.

Disadvantages:

There is no Smart Card Based Travelling due to Only Manual Passengers Activity Patterns and Manual Transit Records.

Proposed System & alogirtham

In the proposed system, the system adopted a comprehensive approach to the pickpocket detection problem. The overall framework of our solution is illustrated in this system. The system first partitioned the city area into regions with functional categories. Then, the

mobility characteristics of passengers were extracted from transit records dynamically over time.

4.1 Advantages:

Effective techniques for Abnormal Traveling Behavior Detection.

Architecture

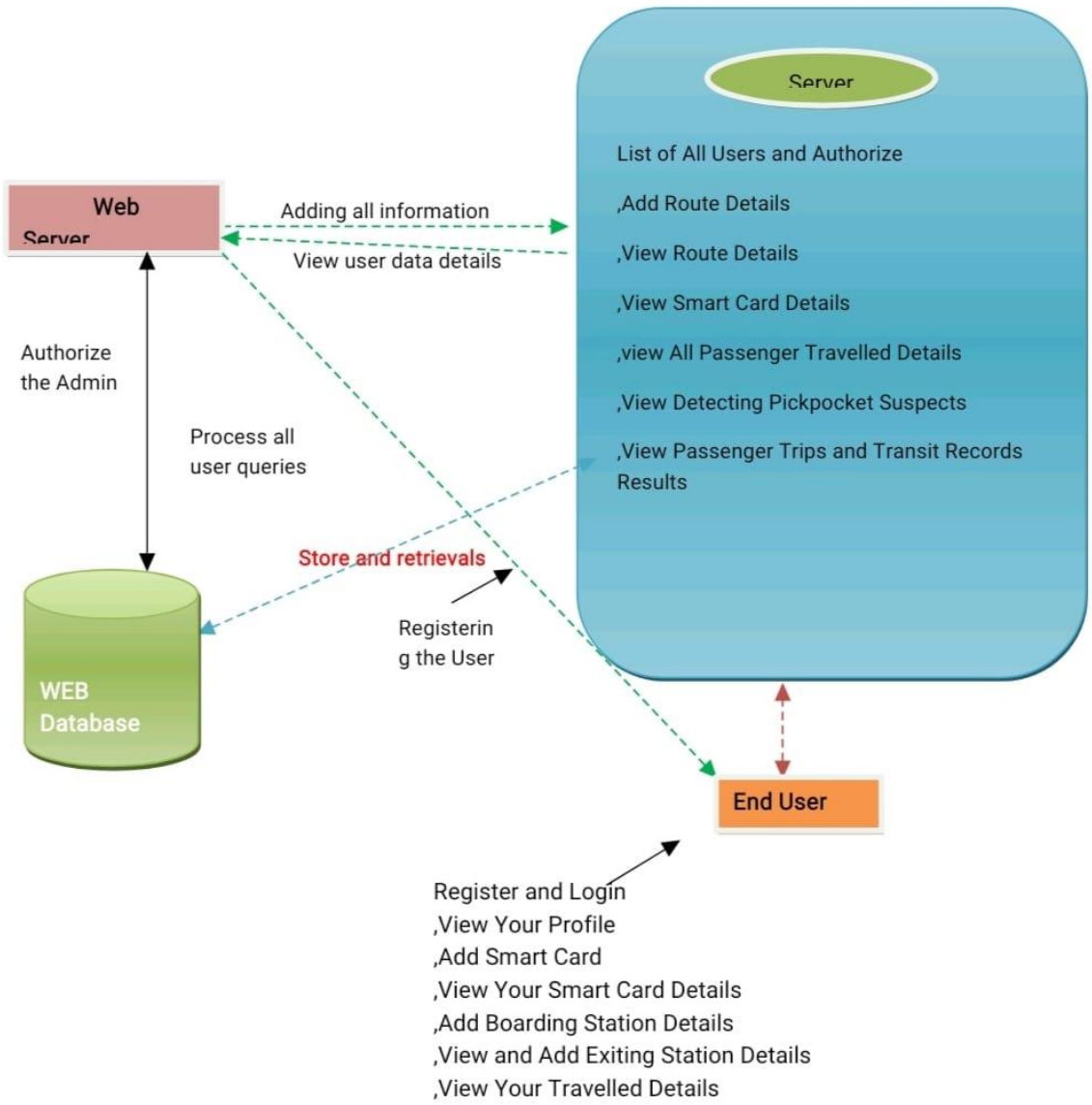


Fig:3.1 System Architecture

IMPLEMENTATION

- **Server**

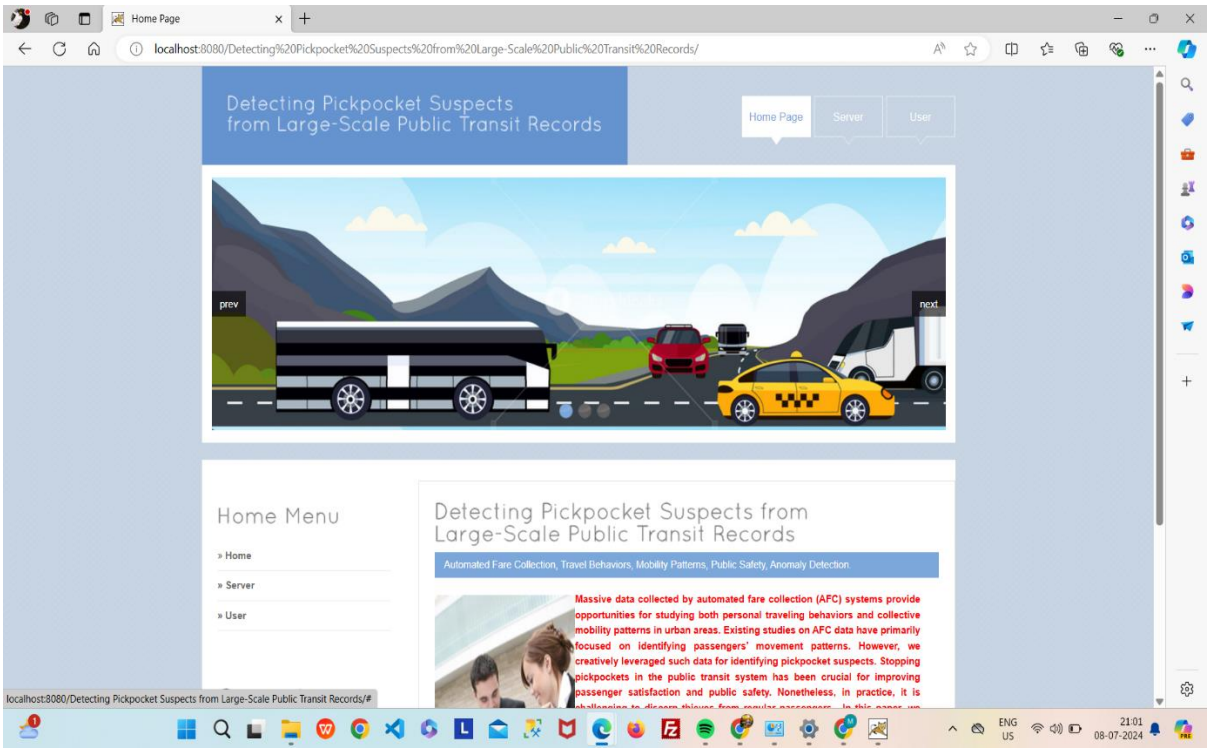
  In this module, the Web Server has to login by using valid user name and password. After login successful he can do some operations such as List of All Users and Authorize, Add Route Details, View Route Details, View Smart Card Details ,view All Passenger Travelled Details ,View Detecting Pickpocket Suspects ,View Passenger Trips and Transit Records Results

- **User**

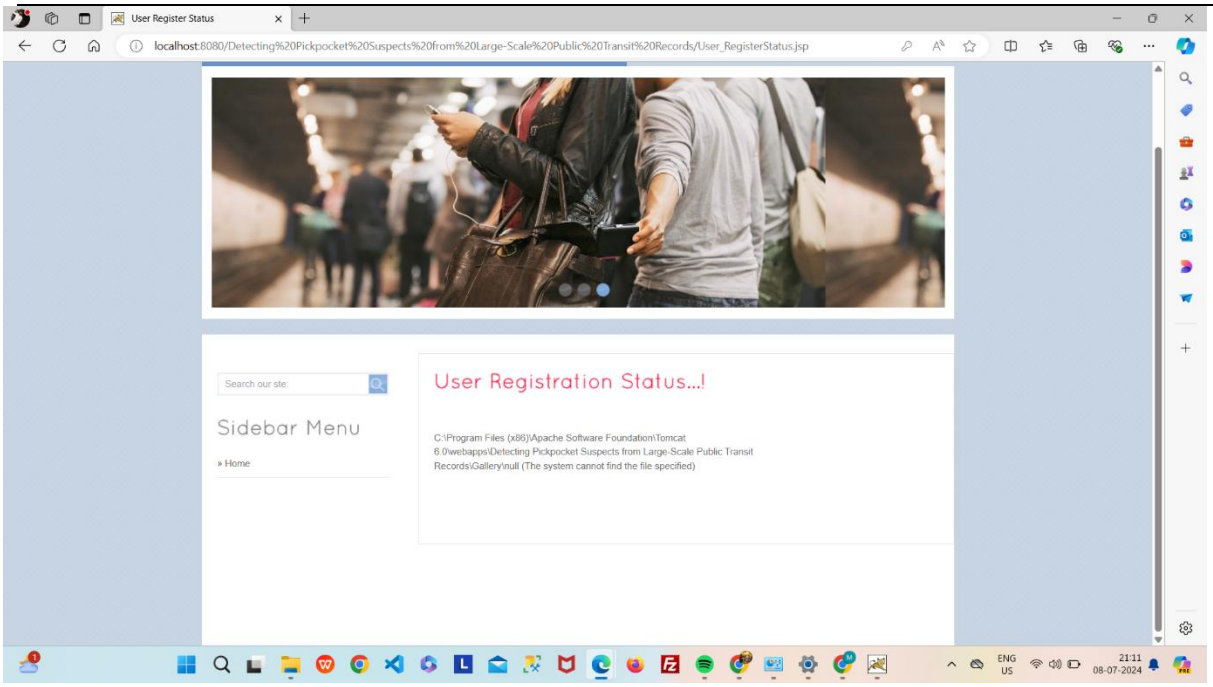
  In this module, there are n numbers of users are present. User should register before doing some operations. After registration successful he has to login by using authorized user name and password. Login successful he will do some operations like View Your Profile, Add Smart Card, View Your Smart Card Details, Add Boarding Station Details, View and Add Exiting Station Details, View Your Travelled Details.

5 RESULTS AND DISCUSSION

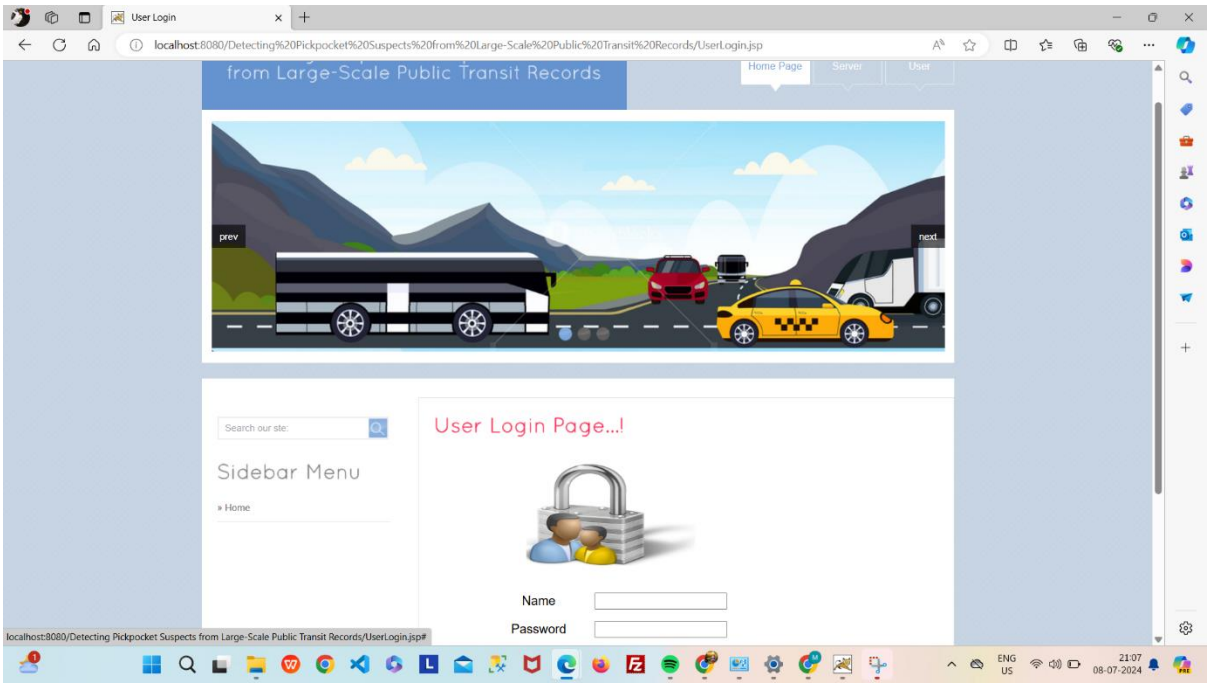
HOME PAGE:

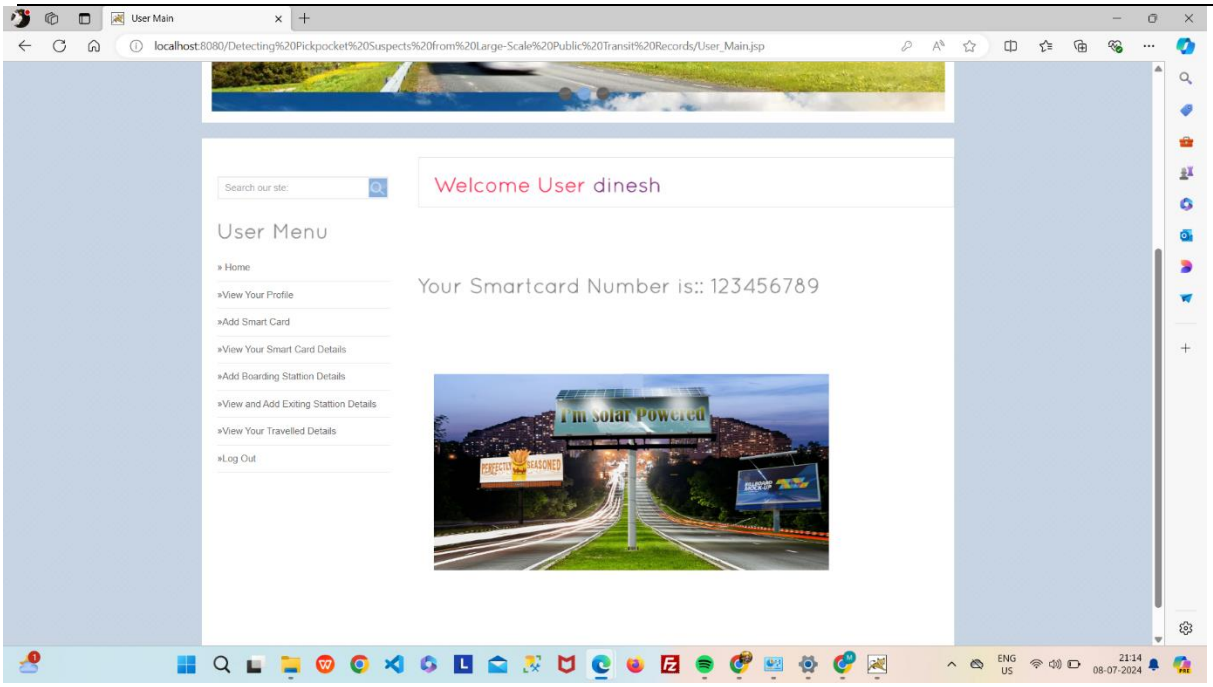


User Registration status:

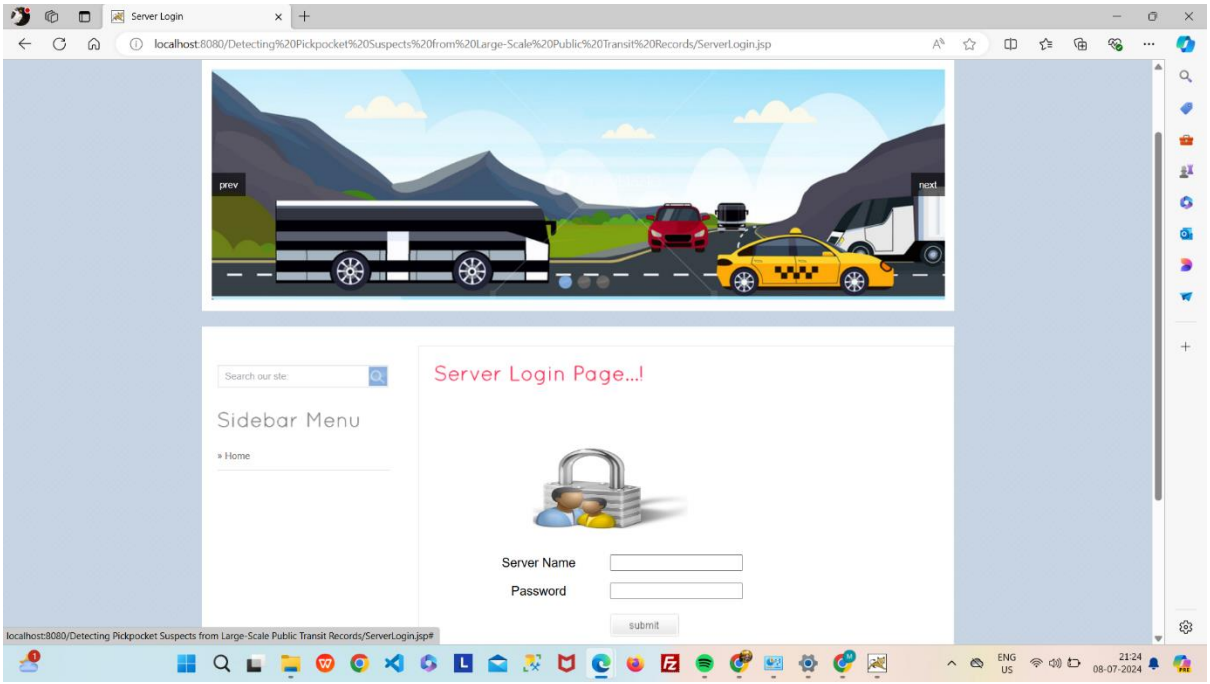


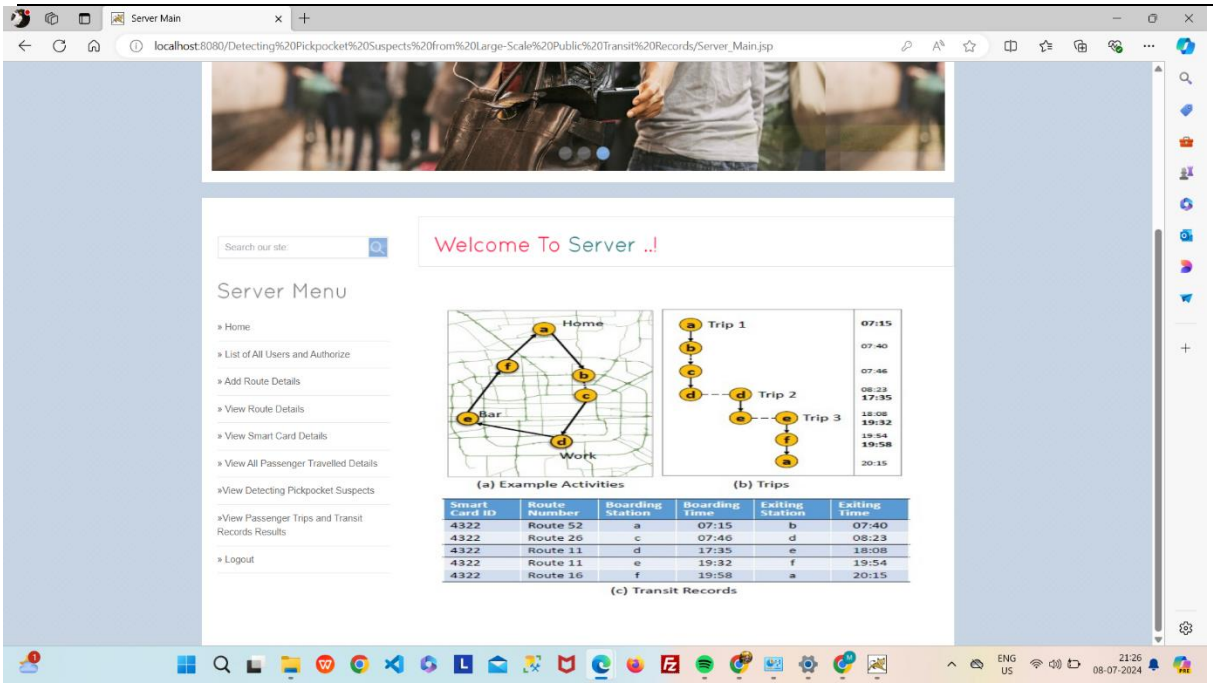
User Login Page:

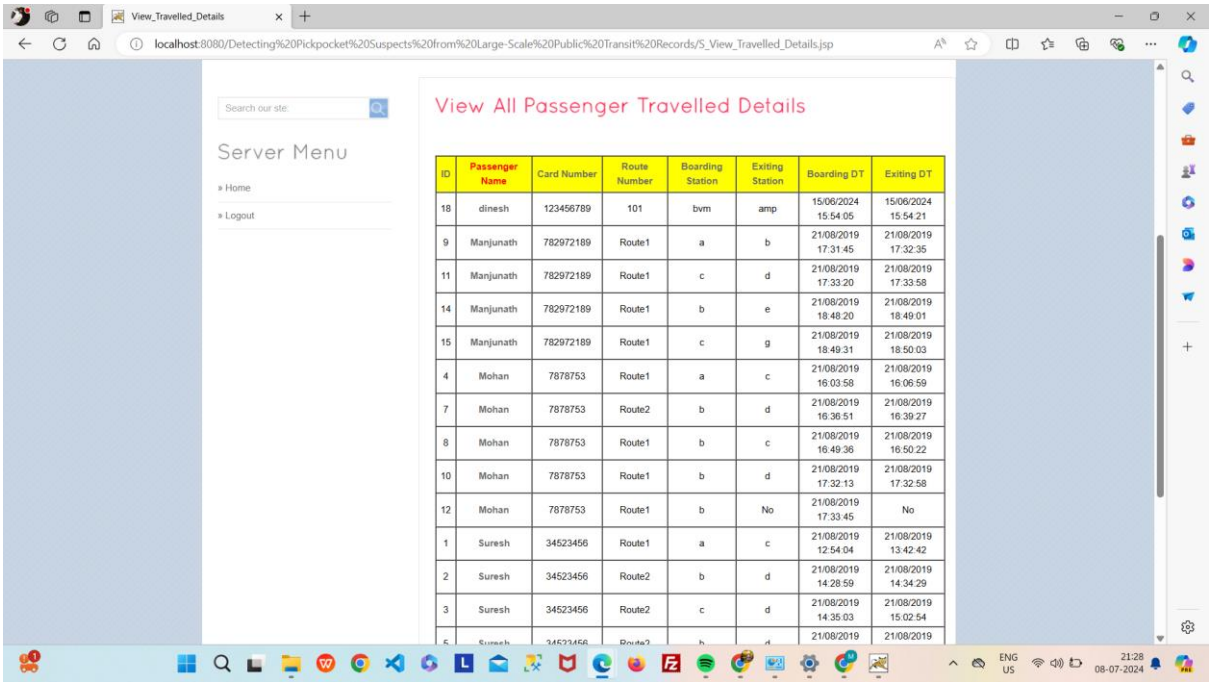


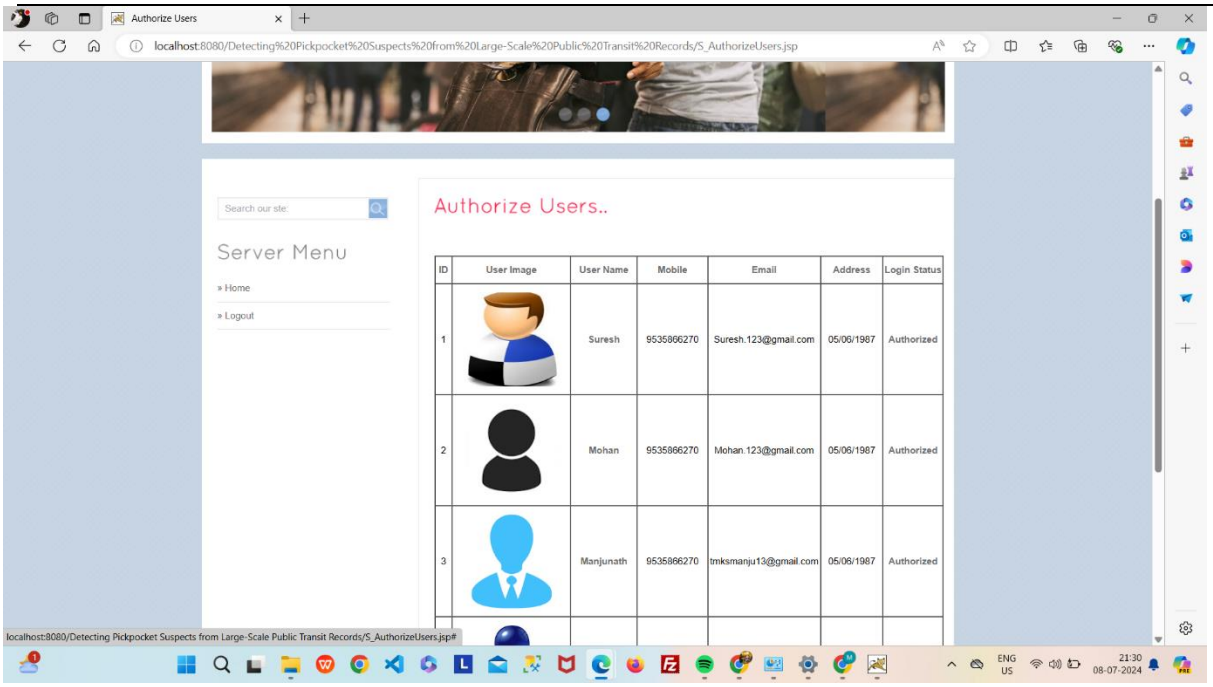


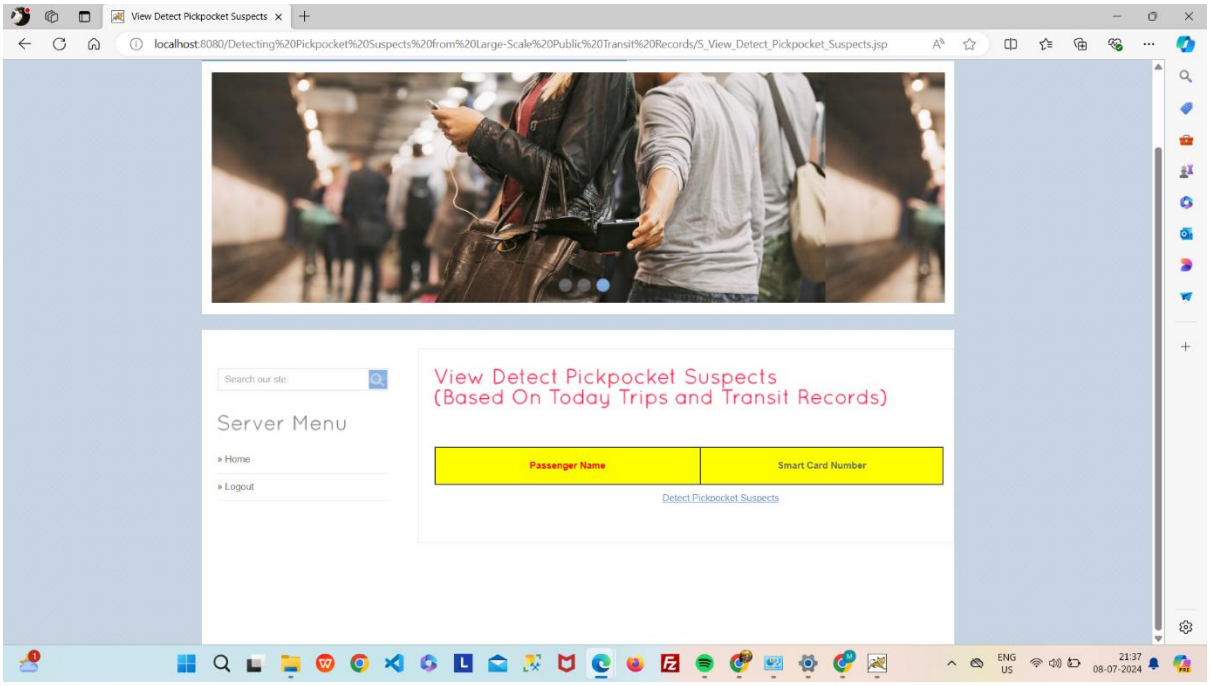
Server Login Page :

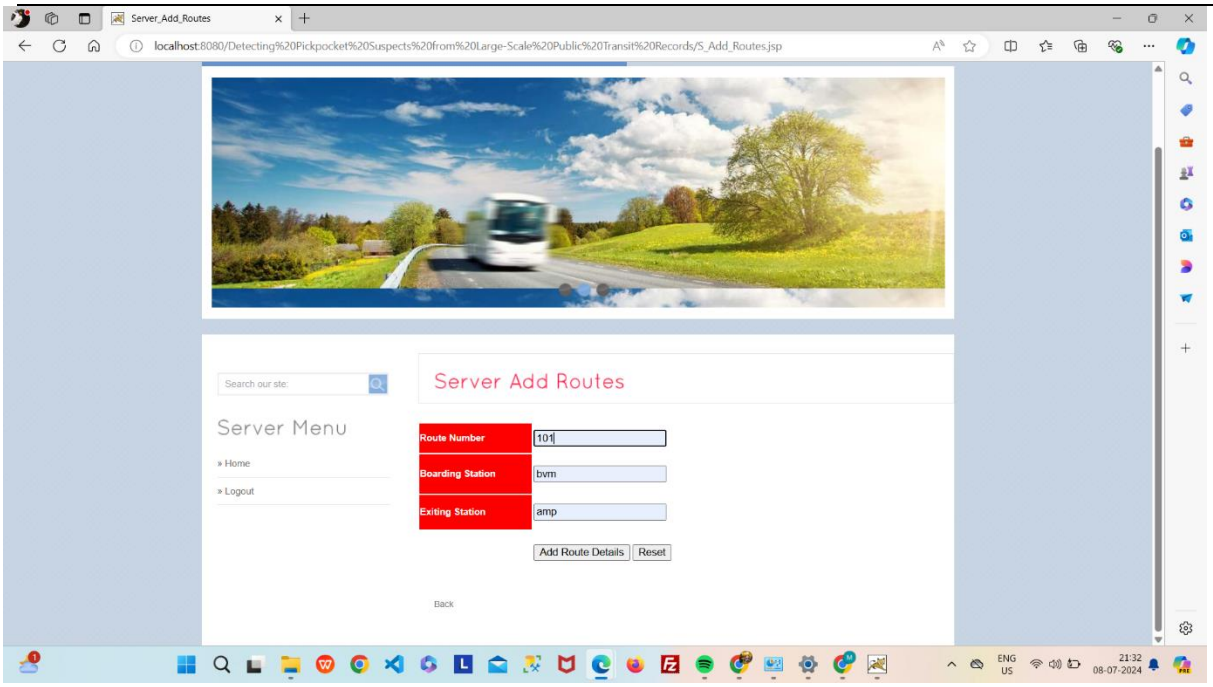


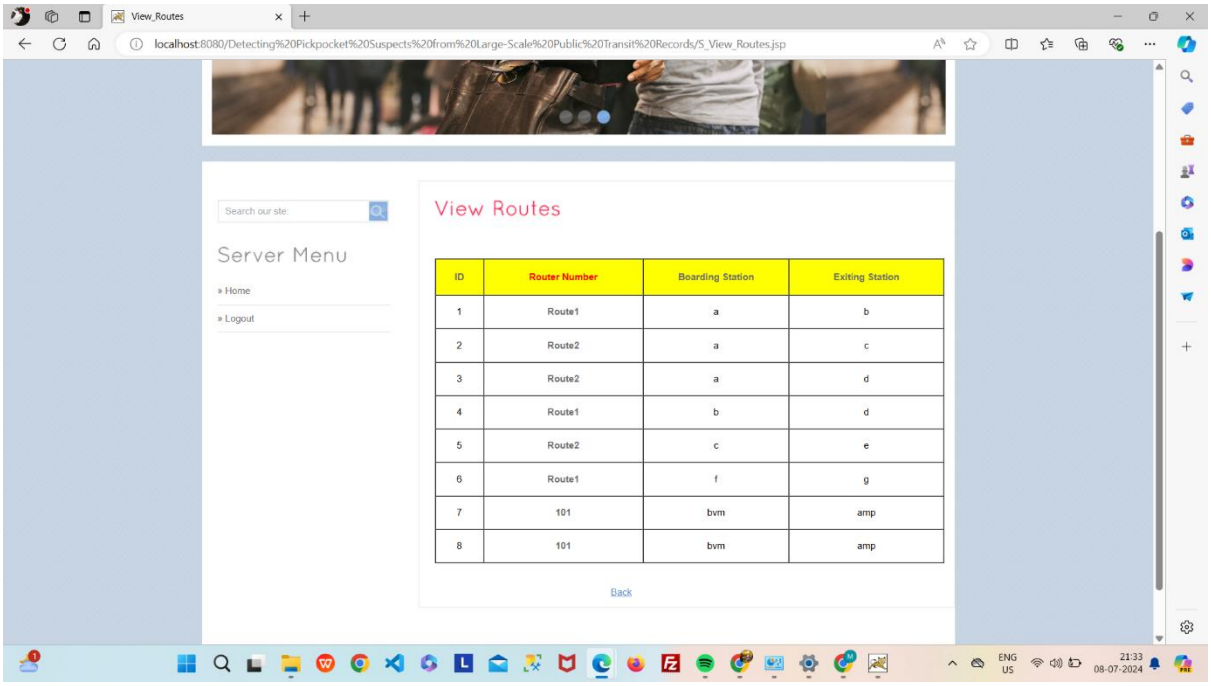

Server Main
localhost:8080/Detecting%20Pickpocket%20Suspects%20from%20Large-Scale%20Public%20Transit%20Records/Server_Main.jsp
Search our site:
Server Menu
» Home
» List of All Users and Authorize
» Add Route Details
» View Route Details
» View Smart Card Details
» View All Passenger Travelled Details
»View Detecting Pickpocket Suspects
»View Passenger Trips and Transit Records Results
» Logout
Welcome To Server ..!
Home
Bar
Work
Trip 1
Trip 2
Trip 3
07:15
07:40
07:46
08:23
17:35
18:08
19:32
19:54
19:58
20:15
(a) Example Activities
(b) Trips
Smart Card ID | Route Number | Boarding Station | Boarding Time | Exiting Station | Exiting Time
4322 | Route 52 | a | 07:15 | b | 07:40
4322 | Route 26 | c | 07:46 | d | 08:23
4322 | Route 11 | d | 17:35 | e | 18:08
4322 | Route 11 | e | 19:32 | f | 19:54
4322 | Route 16 | f | 19:58 | a | 20:15
(c) Transit Records

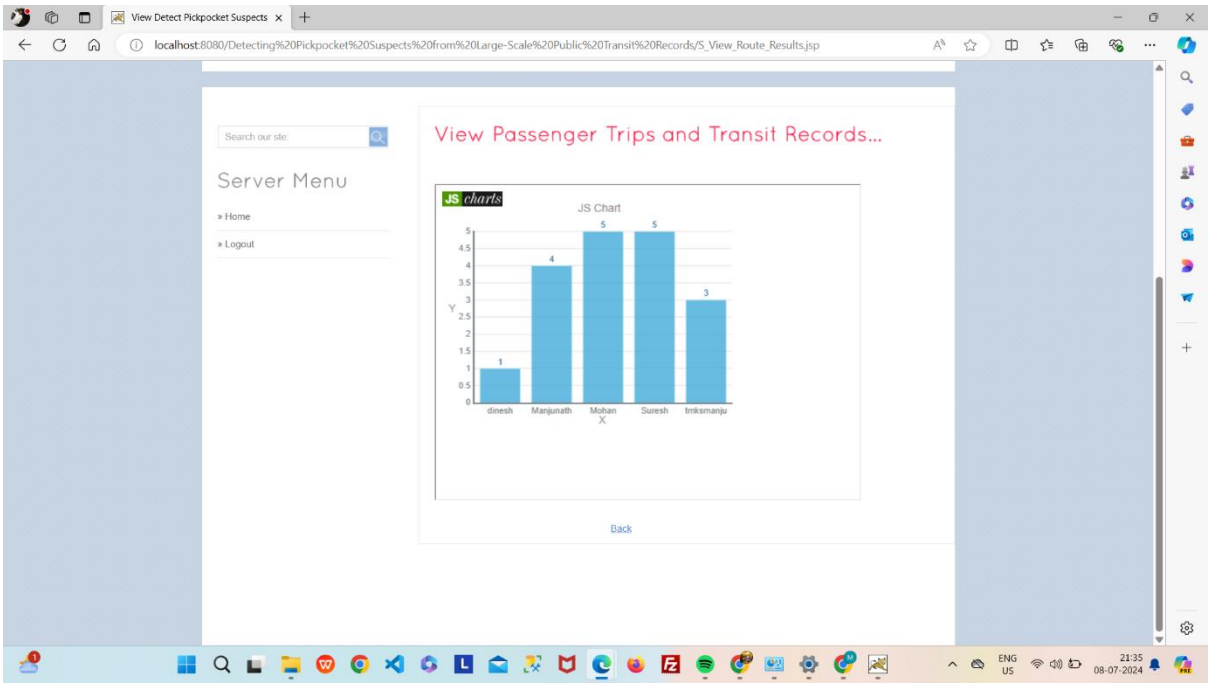

View_Travelled_Details
localhost:8080/Detecting%20Pickpocket%20Suspects%20from%20Large-Scale%20Public%20Transit%20Records/S_View_Travelled_Details.jsp
Search our site:
Server Menu
» Home
» Logout
View All Passenger Travelled Details
ID | Passenger Name | Card Number | Route Number | Boarding Station | Exiting Station | Boarding DT | Exiting DT
18 | dinesh | 123456789 | 101 | bvm | amp | 15/06/2024 15:54:05 | 15/06/2024 15:54:21
9 | Manjunath | 782972189 | Route1 | a | b | 21/08/2019 17:31:45 | 21/08/2019 17:32:35
11 | Manjunath | 782972189 | Route1 | c | d | 21/08/2019 17:33:20 | 21/08/2019 17:33:58
14 | Manjunath | 782972189 | Route1 | b | e | 21/08/2019 18:48:20 | 21/08/2019 18:49:01
15 | Manjunath | 782972189 | Route1 | c | g | 21/08/2019 18:49:31 | 21/08/2019 18:50:03
4 | Mohan | 7878753 | Route1 | a | c | 21/08/2019 16:03:58 | 21/08/2019 16:06:59
7 | Mohan | 7878753 | Route2 | b | d | 21/08/2019 16:36:51 | 21/08/2019 16:39:27
8 | Mohan | 7878753 | Route1 | b | c | 21/08/2019 16:49:36 | 21/08/2019 16:50:22
10 | Mohan | 7878753 | Route1 | b | d | 21/08/2019 17:32:13 | 21/08/2019 17:32:58
12 | Mohan | 7878753 | Route1 | b | No | 21/08/2019 17:33:45 | No
1 | Suresh | 34523456 | Route1 | a | c | 21/08/2019 12:54:04 | 21/08/2019 13:42:42
2 | Suresh | 34523456 | Route2 | b | d | 21/08/2019 14:28:59 | 21/08/2019 14:34:29
3 | Suresh | 34523456 | Route2 | c | d | 21/08/2019 14:35:03 | 21/08/2019 15:02:54


Authorize Users
localhost:8080/Detecting%20Pickpocket%20Suspects%20from%20Large-Scale%20Public%20Transit%20Records/S_AuthorizeUsers.jsp
Search our site:
Server Menu
» Home
» Logout
Authorize Users..
ID
User Image
User Name
Mobile
Email
Address
Login Status
1
Suresh
9535866270
Suresh.123@gmail.com
05/06/1987
Authorized
2
Mohan
9535866270
Mohan.123@gmail.com
05/06/1987
Authorized
3
Manjunath
9535866270
tmksmanju13@gmail.com
05/06/1987
Authorized
localhost:8080/Detecting Pickpocket Suspects from Large-Scale Public Transit Records/S_AuthorizeUsers.jsp#
ENG
US
21:30
08-07-2024


View Detect Pickpocket Suspects
localhost:8080/Detecting%20Pickpocket%20Suspects%20from%20Large-Scale%20Public%20Transit%20Records/S_View_Detect_Pickpocket_Suspects.jsp
Search our site:
Server Menu
» Home
» Logout
View Detect Pickpocket Suspects
(Based On Today Trips and Transit Records)
Passenger Name
Smart Card Number
Detect Pickpocket Suspects
ENG
US
21:37
08-07-2024


Server_Add_Routes
localhost:8080/Detecting%20Pickpocket%20Suspects%20from%20Large-Scale%20Public%20Transit%20Records/S_Add_Routes.jsp
Search our site:
Server Menu
» Home
» Logout
Server Add Routes
Route Number
101
Boarding Station
bvm
Exiting Station
amp
Add Route Details
Reset
Back


View_Routes
localhost:8080/Detecting%20Pickpocket%20Suspects%20from%20Large-Scale%20Public%20Transit%20Records/S_View_Routes.jsp
Search our site:
Server Menu
» Home
» Logout
View Routes
ID
Router Number
Boarding Station
Exiting Station
1 Route1 a b
2 Route2 a c
3 Route2 a d
4 Route1 b d
5 Route2 c e
6 Route1 f g
7 101 bvm amp
8 101 bvm amp
Back



6. CONCLUSION AND FUTURE WORK

CONCLUSION

In this paper, we developed a suspect detection and tracking system by mining large-scale transit records. The system assists in identifying pickpocket suspects' and enables active surveillance in high-risk areas. Specifically, we first constructed a feature representation for profiling passengers. Then, we established a novel two-step framework to distinguish regular passengers from pickpocket suspects. Finally, we leveraged real-world datasets from multiple sources for model training and validation, and implemented a prototype system for end users. Experimental results on real-world data showed the effectiveness of our proposed approach.

7. REFRENCES

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