A university campus public transport (Intermediate, further away)

- **Business objectives, define problem**

  Reduce losses caused by unreturned bicycles

- **Identify activities, outputs, outcomes, and indicators identification**

  Activities:
  1. User real-name authentication(Purpose: Ensure accountability and traceability of users.)
  2. Add a positioning system(GPS),(Integrate geofencing to alert users when they are approaching service area limits.)
  3. Add a rental deposit
  4. Limit service area and maximum use time

  Outputs:
  1. Reduced number of unreturned bikes
  2. Real-time data on bike usage

  Outcomes:
  Reduce bikes costs in company

  Indicators:
  1. Number of bikes returned
  2. User return rate
  3. User usage rate

- **Identify Stakeholders**

  1. User: teachers, students and other users who owns the app
  2. Company: bike owners company, maybe have Operator.

- **Identify Data source**

  1. Google Maps: Provides location data and mapping for bike tracking.
  2. User Information: Includes personal details and authentication data.
  3. User transaction records: Detail the history of bike rentals and returns.

- **Identify level of IT usage**

Level 1, Because it use GPS track system, it provide necessary GPS data and track function. The system employs GPS technology to monitor the real-time location of bicycles, enabling a dynamic and responsive approach to user interactions and potential issues.

- Identify DM technique

  1. Anomaly Detection: To identify unusual patterns or events indicating potential bike theft or misplacement. (If you ride outside the service area and exceed the maximum usage time, it will be judged as an abnormality.)
  2. Graph Mining: Model relationships between users or bikes as a graph. This can be useful for identifying central users or bikes in the network and understanding how misuse or anomalies spread through the system.

- Data as data product (solution)

  The output product for users and stakeholders is a comprehensive notification system integrated into the bike tracking system. This system provides timely alerts and includes the following components:

  1. Notice: Users and stakeholders will receive notifications/alerts in real-time if any abnormal patterns or events are detected. This could include alerts for riding outside the service area or exceeding the maximum allowed usage time.
  2. GPS Information: The system will provide detailed GPS information pinpointing the location of the bike at the time of the anomaly. This aids in quick response and recovery efforts.
  3. Map Integration: Users and stakeholders will have access to a map interface displaying the route taken by the bike during the abnormal event. This visual representation enhances situational awareness.
  4. User Information: The notification will include relevant user information, allowing for easy identification and communication with the user involved in the anomaly.

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