What does VSafeRoute do ?

This is a multi-agent AI-based web application designed to improve road safety for cyclists by providing safer route suggestions and real-time hazard alerts.

- Identify crash hotspots and predict high-risk areas.
- Analyze real-time user feedback to dynamically update route safety and highlight hazards like potholes or poor lighting.
- Provide data-driven policy recommendations to help city planners improve cycling infrastructure.

This solution enhances safety, encourages cycling, and empowers both cyclists and policymakers with actionable insights.

How is it a multi-agent AI based web application ?

1. Feedback Processing Agent

This agent will process user-reported feedback and dynamically update the system to reflect new hazards or issues reported by cyclists.

Model: Natural Language Processing (NLP) for feedback analysis

- Use a simple NLP model like **BERT** or **TF-IDF with a classifier** to analyze textual feedback.

Data we will be getting from the user:


```
{
        "user_id": "user123",
        "location": {"latitude": -37.5625, "longitude": 143.8503},
        "issue_type": "Ran off carriageway",
        "Description": "The bike lane is too narrow at the intersection and the markings are faded.",
        "severity": 4,
        "time_of_occurrence": "2023-09-01T18:30:00",
        "phone_number": “+61”,
        "suggestion": “”
}
```

Data Processing Flow:

1. Tokenize, clean, and categorize free-text feedback using models like **TF-IDF** or **BERT**.
2. Label and categorize issues based on feedback.
3. Map recurring issues and severity levels onto the route map for future predictions and preventive measures.
4. Use the categorized data to train models on hazard prediction and route safety scoring.

2. Crash Hotspot Identification Agent

This agent will use historical crash data to identify high-risk areas (hotspots). A model like a **spatial clustering algorithm** can be used here.

Model: DBSCAN (Density-Based Spatial Clustering of Applications with Noise)

- DBSCAN can detect clusters of crashes without needing predefined regions. It's well-suited for identifying arbitrary crash hotspots.

Benefits or value the concept could achieve:

- Data-Driven Decision Making: By using crash data, traffic patterns, and real-time feedback, the app can help cyclists make informed decisions about safer routes, reducing the likelihood of accidents.
- Crash Hotspot Identification: AI can highlight high-risk areas, providing cyclists with warnings and alternative routes to avoid potential hazards, thereby lowering accident rates.
- Feedback Processing: Collecting real-time reports from cyclists on hazards or dangerous conditions can alert other users immediately and update route safety dynamically.
- Evidence-Based Policy Recommendations: The system can help local governments make data-driven decisions about where to improve infrastructure (e.g., adding bike lanes, improving signage, or fixing road conditions). This can optimize budget allocation for road improvements in areas where cyclists are most at risk.
- Increased User Participation: By allowing cyclists to report road issues and safety concerns, users become more engaged in improving cycling conditions, creating a community-driven safety network. This also provides a sense of ownership over their routes and surroundings.

- Improved Health and Wellbeing: Promoting cycling with safer routes can have a significant impact on public health by encouraging active transportation, which can reduce health issues related to sedentary lifestyles and vehicle emissions.