**Minimum Viable Product (MVP) Report**

**Electric Vehicle Adaptive Tools (EVAT)**

**1. Executive Summary**

The Electric Vehicle Adaptive Tools (EVAT) app aims to simplify the electric vehicle (EV) charging experience for users in Australia. The app leverages innovative data science and mapping technologies to provide seamless features, including locating chargers, planning trips, and understanding charging trends. While the MVP primarily focuses on basic functionalities, the foundation has been set for integrating advanced features such as user-defined filters, trip planners, and AI-driven tools.

The app is currently in its early stages but holds tremendous potential to address real-world challenges faced by EV users.

**2. Purpose of the MVP**

The MVP is designed to:

* Demonstrate core functionalities to stakeholders.
* Provide a prototype for user feedback and iteration.
* Serve as a foundation for future feature expansions, including AI/ML integrations.

**3. Features Implemented in the MVP**

**3.1. Core Features**

1. **Interactive Map of Charging Stations**:
   * Displays all nearby EV charging stations on a map.
   * Uses geospatial data from the MongoDB database.
   * Allows users to click on a station for details such as:
     + Charger type (AC/DC).
     + Availability.
     + Address and operator details.
2. **Navigation to Charging Stations**:
   * Integrated with Google Maps API to provide turn-by-turn navigation to selected charging stations.
   * Enables users to plan their route to a single station effectively.
3. **Frontend Development**:
   * Built a responsive interface using **React Native**.
   * UI elements include:
     + A map interface.
     + Charger detail pop-ups.
     + Navigation options.

**4. Features Yet to be Implemented**

1. **User-Defined Filters for Finding Chargers**:
   * Filters to include:
     + Amenities (e.g., restrooms, restaurants).
     + Charging type (e.g., fast charging, level 2).
     + Charger power rating and current type (AC/DC).
   * Users will refine their search to find chargers that suit their specific needs.
2. **Trip Planner**:
   * Allow users to:
     + Input a destination.
     + Generate optimized routes with charging stops.
     + Include real-time charger availability and user preferences.
3. **Integration of Basic Functions**:
   * Individual components (map, navigation, and future filters) are to be integrated into a cohesive system for improved usability.
4. **User Accounts and Profiles**:
   * Enable users to:
     + Create accounts.
     + Save routes and preferences.

**5. Technical Overview**

**5.1. Tech Stack**

* **Frontend**:
  + **React Native**: Ensures cross-platform compatibility and a responsive UI.
  + **Material UI**: Pre-styled components for a consistent design.
* **Backend**:
  + **FastAPI**: Lightweight, high-performance API development.
  + **MongoDB**: NoSQL database to store charging station data, user preferences, and session logs.
* **Geospatial Tools**:
  + **Google Maps API**: For map rendering and navigation features.
* **Integration**:
  + RESTful APIs to connect the frontend with backend functionalities.

**5.2. Current Architecture**

* **Data Flow**:
  1. **User Input**: Select a station or search by filters (future feature).
  2. **Backend Processing**: Retrieve charger data from MongoDB.
  3. **Frontend Display**: Render data on the map and enable navigation.
* **Database Design**:
  1. Collections in MongoDB include:
     + charging\_stations: Geospatial data and charger details.
     + users: Placeholder for user profiles and saved preferences.

**6. Challenges Identified**

1. **Integration**:
   * While basic functions exist, connecting all components into a seamless experience is pending.
2. **Data Completeness**:
   * Current charger data is limited to preloaded datasets; integration with live APIs (e.g., Open Charge Map) is required.
3. **User Feedback**:
   * MVP lacks user-defined filters, which are critical for personalization.

**7. Future Work and Timeline**

| **Feature** | **Timeline** | **Description** |
| --- | --- | --- |
| **User-Defined Filters** | 2 weeks | Add functionality to filter stations by amenities, charger type, etc. |
| **Trip Planner** | 3 weeks | Develop optimized routes with charging stops. |
| **Integration** | 2 weeks | Combine all components into a cohesive app. |
| **User Accounts** | 1 week | Implement login and route-saving features. |
| **AI/ML Models** | 4 weeks | Integrate demand forecasting, blackspot prediction, and availability prediction features. |

**8. Recommendations**

1. **Focus on Integration**:
   * Prioritize linking the existing map and navigation features into a seamless workflow.
2. **Introduce Filters Next**:
   * User-defined filters will enhance usability and provide immediate value.
3. **Iterative Testing**:
   * Test features with a small group of users to gather feedback for improvements.
4. **AI Integration Planning**:
   * Begin scoping AI models (e.g., demand forecasting, charger availability prediction) for the next phase of development.

**9. Visuals and Screenshots**

(Include mockups or screenshots of the current app interface here, showcasing the map, navigation features, and UI.)

**10. Conclusion**

The EVAT MVP provides a strong foundation for creating a user-friendly, data-driven EV charging solution. By focusing on integration, adding essential filters, and incorporating AI/ML features in future iterations, the project is well-positioned to make EV ownership in Australia more seamless and efficient. With continued development and collaboration, the EVAT app can set a benchmark for adaptive EV tools.