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Finite Loop
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HACKFEST – 2025

Team Name: Stealthy Kittens

College Name: Moodlakatte Institute of Technology, Karnataka

Track: Sustainable Development[DEMETER]

Problem Statement: Indian coal mines struggle with tracking emissions, managing carbon credits, and meeting regulations, requiring a solution for accurate emission quantification and seamless carbon credit management.

Approach:

- Web app to quantify carbon footprint of Indian coal mines
- Real-time emissions tracking & scenario planning
- Data visualization for sustainability monitoring
- Tailored strategies for regulatory compliance & carbon neutrality

Technology Stack:

- **Frontend:** React.js (UI), Figma (Design)
  Backend: Flask (API), Firebase (Auth & DB)
- **Machine Learning:** Scikit-learn (Prediction)
- **Version Control & Deployment:** GitHub, Firebase Hosting
- **Data Visualization & Reporting:** Chart.js/Recharts (Graphs), Pandas (Data Processing)

Use Cases:

- Emission calculation & reporting
- Regulatory compliance & sustainability tracking
- Carbon credit estimation & strategy simulation
- Data-driven decision-making for mine operators

Architecture:

User Interface:

- Interactive, responsive dashboard .

Application Layer:

- Emission calculations, reduction strategies, and API integration for data.

Data Layer:

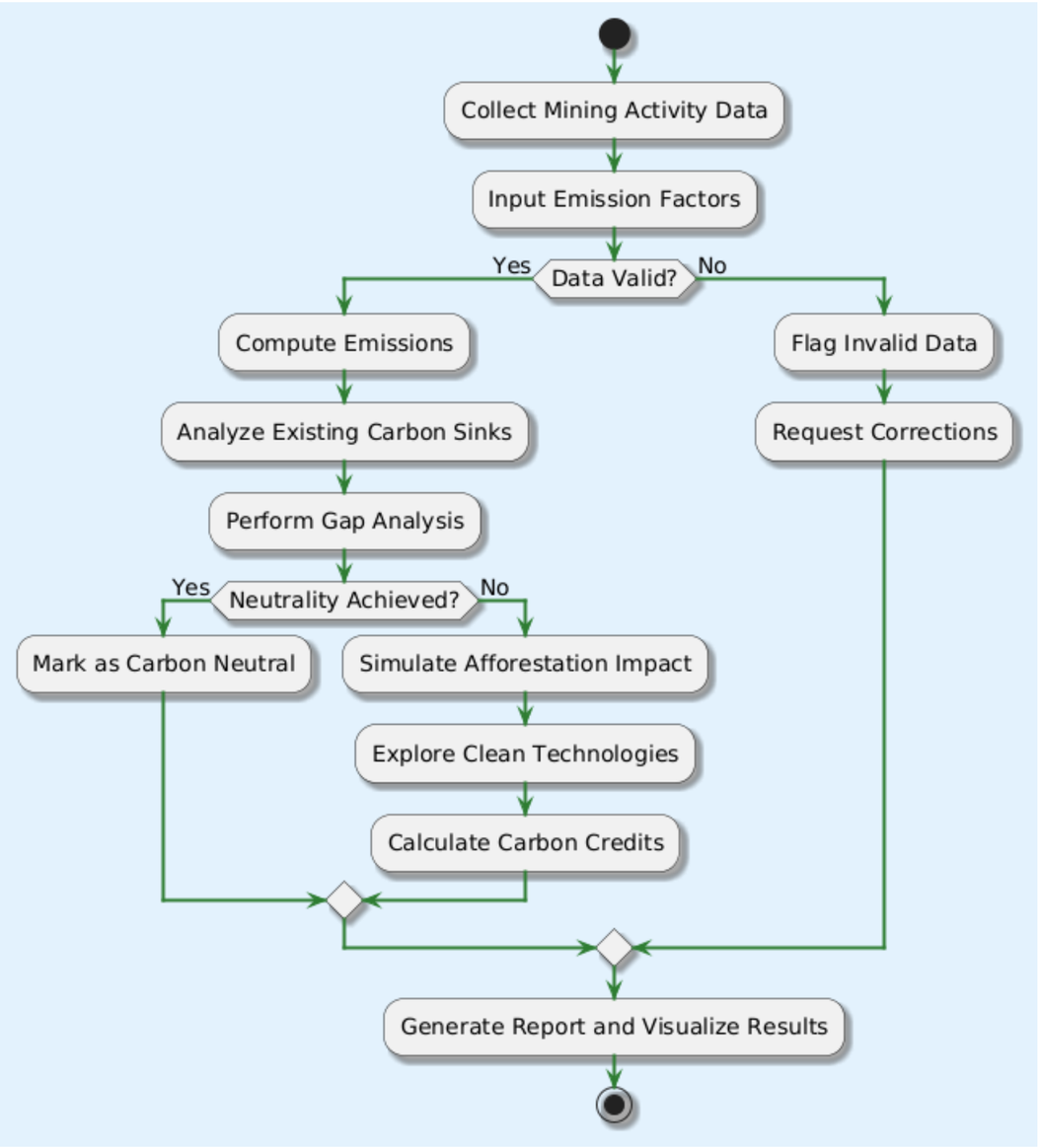
- Centralized data storage with real-time ingestion and encryption.

Integration & Analytics:

- AI/ML models for prediction and carbon neutrality pathways.
- Real-time reports, scenario planning, and scalable microservices.

Carbon Credit Module:

- Tracks, quantifies, and facilitates carbon credit trading.
- Ensures compliance and government oversight.



Additional Information:

1.AI-Driven Carbon Neutrality Pathways:

- Utilizes machine learning to predict future emissions and recommend optimal carbon reduction strategies.
- Provides real-time scenario analysis considering both economic and environmental impacts.

2.Carbon Credit Management & Trading:

- Accurately quantifies carbon credits generated through emission reduction and afforestation.
- Enables mines to **sell surplus credits** or **buy credits** to offset emissions, ensuring compliance.
- Facilitates seamless integration with verified carbon markets, creating financial incentives for mines.

3.Government Monitoring & Compliance:

- Ensures transparency by enabling government bodies to monitor carbon credit transactions and environmental compliance.
- Generates automated compliance reports to align with India’s climate action goals.

4.Environmental Impact & Sustainability:

- Supports afforestation and reforestation projects to offset residual emissions.
- Promotes a circular economy by encouraging sustainable practices within the mining sector.