



- Project Title :- Interactive 3D Knowledge Graph Builder
- Problem Statement ID :- PS9
- Team Name: NEURAL MINDS
- Team ID: HK-193
- Team Members : Sadgyan / Anshika / Ashish / Shashikant



Problem & SOLUTION

- The Problem : Current professional portfolios are fragmented across disconnected platforms like GitHub (code), Notion (documentation), and various certification providers. This silos a student's technical growth, making it difficult to visualize the interconnections between disparate projects and core conceptual competencies.
- The Solution: An automated system that aggregates multi-source data to generate a dynamic, interactive 3D Knowledge Graph. By leveraging NLP for entity extraction and graph theory for relationship mapping, the system provides a holistic, navigable view of a learner's technical evolution.



Flow of Solution

- **Data Ingestion** : Utilizing GitHub REST API and Notion API to fetch commit history, repository READMEs, and structured databases.
- **Semantic Analysis** : Implementing an NLP pipeline (using models like **BERT** or **spaCy**) to extract technical entities, tools, and proficiency levels from raw text.
- **Graph Synthesis** : Mapping extracted entities into a **Property Graph Model**, establishing "WORKS_ON" or "KNOWS" relationships between projects and skills.
- **Real-time Rendering** : Pushing the graph data to a 3D engine for a force-directed, interactive visualization.



TECH STACK & APPROACH

- Frontend : (Ashish Raj)
 - > React.js
 - > Three.js(3D visualization)
- Back-end : (Anshika singhal)
 - > Node.js
 - > Express.js
- ML/AI : (Sadgyan Singh)
 - > Python
 - > NLP-based data modelling
 - > FastAPI (ML microservice)
- Database / Graph: (Shashi Kant)
 - > Graph-based data modelling
 - > JSON → Node/ Edge mapping.

Approach: Modular microservice architecture with ML as an independent service.



UNIQUENESS & INNOVATION FACTOR

- Converts **raw GitHub activity** into structured skill intelligence.
- Uses **confidence + temporal progression**, not static resumes.
- **3D interactive knowledge graph** instead of flat dashboards.
- Explainable AI approach (transparent scoring logic).



Feasibility:

- Uses real, publicly available GitHub data
- Lightweight ML models → fast inference
- Scalable modular architecture

Challenges:

- Skill normalization from noisy text
- Visual clarity in large 3D graphs
- Data consistency across platforms

Mitigation:

- Controlled vocabularies
- Graph filtering & clustering
- API-based modular design



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ReSeARCh & RefeRenCe

GitHub API Documentation

NLP Techniques for Skill Extraction

Knowledge Graph Modeling Concepts

Three.js Documentation

FastAPI Official Docs



Future Scope

- **Multi-Platform Integration**
Extend data sources beyond GitHub by integrating platforms such as LinkedIn, LeetCode, and Coursera for richer skill insights.
- **Advanced AI-Based Skill Prediction**
Use advanced Machine Learning and Deep Learning models to predict future skill trends and identify skill gaps.
- **Personalized Career Roadmaps**
Generate customized learning paths and career recommendations based on a user's current skill graph.
- **Real-Time Skill Updates**
Continuously update the knowledge graph using real-time GitHub activity and learning progress.
- **Enterprise & Academic Adoption**
Scale the platform for use by universities, training institutions, and recruiters for skill assessment and talent evaluation.



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Thank You!