iPELiNT: AI-Powered Patent Application Analysis and Reporting System

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Background & Goals

The patent prosecution process in extremely complex, resulting in many patents being rejected by the USPTO's outdated process. This project develops an AI-powered patent analysis dashboard designed to streamline the patent prosecution process for attorneys and practitioners, addressing a critical need in the patent industry. Goals included updating the current application to provide an all-in-one platform that simplifies complex patent analysis, replacing traditionally fragmented and cumbersome processes with a streamlined, intuitive interface and custom tools to increase user efficiency.

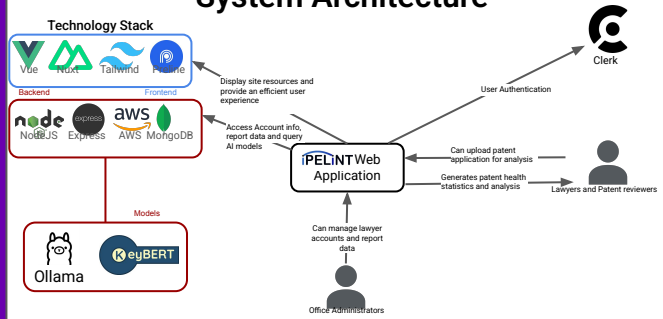
Outcomes

The development of iPELiNT resulted in a fully functional AI-powered patent analysis dashboard that streamlines the patent prosecution process. The project successfully integrated advanced machine learning models, automated data processing, and a user-friendly interface. The final product enhances efficiency for patent attorneys by consolidating fragmented processes into a single, accessible platform. By improving search capabilities, generating detailed reports, and offering insights into patent applications, iPELiNT reduces manual workload and accelerates decision-making in the patent industry.

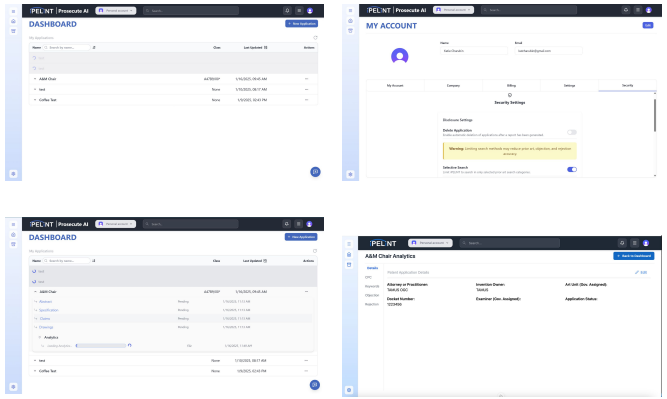
Challenges

The team faced several challenges throughout the development process. Not everyone had the same skill level, leading to a learning curve for some members while others had more experience. As new features and developments were introduced, the team had to relearn parts of the system, adding complexity to the workflow. Additionally, changes made by other teams required extra diligence in reviewing pushes to prevent conflicts. Other difficulties included coordinating meeting availability, independently managing tasks, resolving merge conflicts, and addressing unexpected bugs. Despite these obstacles, the team adapted and strengthened their collaboration, improving both the system and their technical skills.

System Architecture



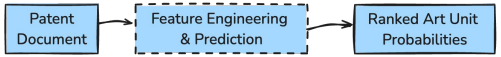
User Interface



Models

During frontend refinement for the patent platform, parallel development focused on two AI modules: (1) a classifier mapping patents to art units via semantic embeddings, and (2) a query builder converting keywords into Boolean logic using fine-tuned LLMs

Art Unit Model
An NLP-driven pipeline that transforms unstructured patent text into art unit probabilities through domain-specific keyword extraction, context-aware summarization, and semantic embedding generation. By integrating KeyBERT with PatentSBERTa for phrase mining, BART for distillation of key concepts, and cloud-based infrastructure for scalable processing, our system enables rapid identification of technical patterns across millions of patents.



Patent Search Query Model
This component introduces a 4-bit Llama-3 model optimized via Unsloth for patent search automation. Fine-tuned on Alpaca-formatted instructions, it transforms Term Frequency/Inverse Document Frequency-derived phrases into structured Boolean queries aligned with examiner best practices. It embeds SRNT syntax rules directly into the training framework.

Supported By:

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