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INTRODUCING OUR SPONSORS

WYNTRIX

WEALTH EMPIRES

TEAM DETAILS

TEAM NAME : Codoing ninja

TEAM MEMBERS :

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PROBLEM STATEMENT NO : 7

PROBLEM STATEMENT TITLE

Title:

CampusNexus AI

Unified AI-Powered Knowledge Search for Smart Campuses

Problem Statement:

Current Challenges in Campus Knowledge Management:

• **Information Overload**: Students and faculty struggle to find relevant information across scattered documents (PDFs, presentations, notes)

•**Inefficient Search**: Traditional keyword search fails to understand context and semantic meaning

• **API Dependency & Cost**: Most AI solutions require expensive API subscriptions and constant internet connectivity

•**Privacy Concerns**: Uploading sensitive academic content to external cloud services poses data security risks

• **Language Barriers**: Limited support for multilingual queries makes knowledge inaccessible to diverse student populations

• **No Analytics**: Lack of insights from previous year questions (PYQs) and academic patterns

PROPOSED SOLUTION

CampusNexus AI: A Fully Local, AI-Powered Knowledge Hub

- Our Solution: A 100% offline, privacy-first AI system that enables intelligent semantic search across academic content without any external dependencies.

Key Innovation:

- Zero API Keys Required - Completely free to run
- Fully Local Processing - No data leaves your machine
- Advanced RAG (Retrieval-Augmented Generation) - AI answers with source citations
- Multi-Modal Support - PDF, DOCX, PPTX processing
- Intelligent Context Understanding - Semantic search powered by local embeddings

Technology Stack:

- Local LLM: Ollama + Mistral (7B parameters)
- Vector Database: ChromaDB for semantic search
- Embeddings: SentenceTransformers (all-MiniLM-L6-v2)
- Backend: FastAPI + LangChain
- Frontend: Modern HTML5, CSS, JavaScript

KEY FEATURES

1.AI-Powered RAG Chat
- Ask questions in natural language
- Get accurate answers with source citations
- Confidence scores for each response
- View referenced document chunks

2. Multi-Format Document Upload
- Support for PDF, DOCX, PPTX files
- Drag-and-drop interface
- Automatic text extraction and indexing
- Smart chunking for optimal retrieval

3. PYQ (Previous Year Questions) Analytics
- Automatic topic classification
- Difficulty pattern analysis
- Year-wise trend visualization
- Important topic identification
- Question frequency tracking

4. Knowledge Graph Visualization

KEY FEATURES

- Entity relationship extraction
- Visual concept mapping
- Graph statistics (nodes, edges, density)
- Interactive exploration

5. Multilingual Support

- 5 Languages: English, Hindi, Spanish, French, German
- Query and respond in any language
- Context-aware translation

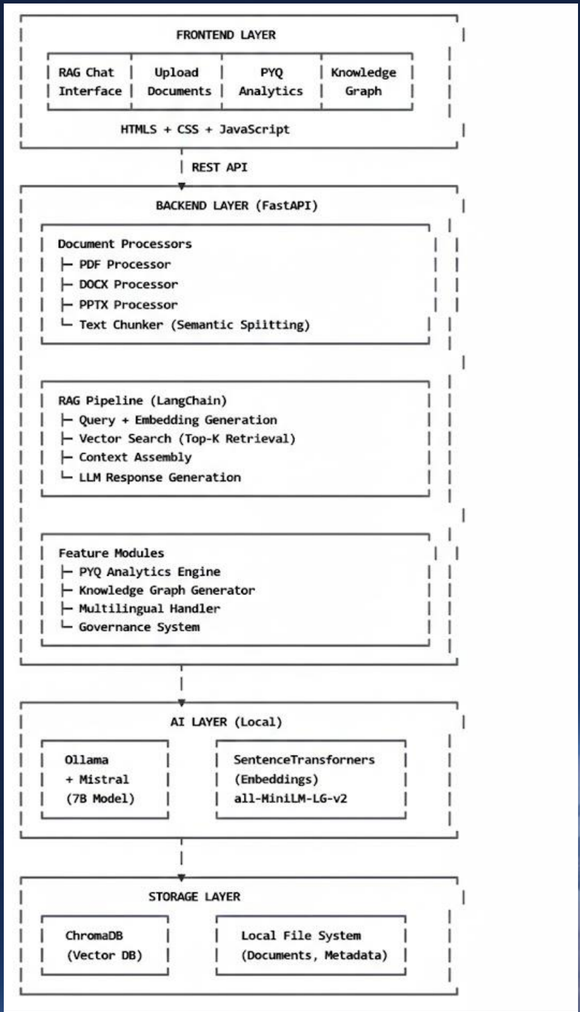
6. Governance & Analytics

- Document approval workflow
- Usage statistics dashboard
- Access control management
- System monitoring

7. Complete Privacy

- 100% local processing
- No external API calls
- No telemetry or tracking
- Full data ownership

SYSTEM ARCHITECTURE



- Architecture Highlights:
- 3-Tier Architecture: Frontend, Backend, AI Layer
- Microservices Pattern: Modular feature components
- Local-First: All processing happens on-device
- Scalable: Supports multiple concurrent users

WORKFLOW (HOW IT WORKS)

Phase 1: Document Ingestion

- Upload → User uploads PDF/DOCX/PPTX files via drag-and-drop interface
- Extract → Document processors extract text content from files
- Chunk → Text is split into semantic chunks (configurable size)
- Embed → Each chunk is converted to vector embedding using SentenceTransformers
- Index → Embeddings stored in ChromaDB with metadata

Phase 2: Query Processing (RAG)

- User Query → Student asks: "Explain the OSI model layers"

Embedding → Query converted to vector embedding

- Retrieval → ChromaDB finds Top-K most similar document chunks
- Context Building → Retrieved chunks assembled into context
- Generation → Mistral LLM generates answer using context
- Response → User receives answer with:
- Generated text
- Source citations
- Confidence scores
- Related documents

WORKFLOW (HOW IT WORKS)

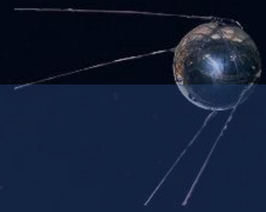
Phase 3: Analytics & Insights

- PYQ Analysis:
- Extract questions from uploaded papers
- Classify by topic using NLP
- Generate frequency and difficulty metrics
- Visualize trends and patterns
- Knowledge Graph:
- Extract entities (concepts, topics, keywords)
- Identify relationships between entities
- Build networkx graph structure
- Render interactive visualization

Phase 4: Governance

- Admin reviews uploaded documents
- Approve/reject based on quality
- Monitor system usage statistics
- Track query patterns

IMPACT & BENEFITS



For Students:

- ✅ Time Savings: 60% faster information retrieval
- ✅ Better Understanding: AI explanations with sources
- ✅ Exam Preparation: PYQ insights reveal important topics
- ✅ Language Flexibility: Study in preferred language
- ✅ 24/7 Availability: No internet required

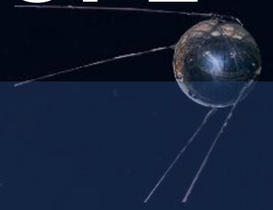
For Faculty:

- ✅ Content Management: Centralized knowledge repository
- ✅ Usage Analytics: Track what students search for
- ✅ Quality Control: Document approval workflow
- ✅ Research Aid: Quick reference across materials

For Institutions:

- ✅ Cost Savings: Zero API fees (vs. $100-500/month for cloud AI)
- ✅ Data Privacy: 100% compliance with data protection regulations
- ✅ Offline Access: Works in low-connectivity environments
- ✅ Scalability: Serve entire campus from single server
- ✅ Customization: Full control over model and features

CONCLUSION & FUTURE SCOPE



Conclusion

- CampusNexus AI represents a paradigm shift in campus knowledge management:
- ✨ Democratizes AI: Makes advanced AI accessible without expensive subscriptions
🔒 Prioritizes Privacy: Keeps sensitive academic data on-campus
🎓 Enhances Learning: Transforms how students interact with academic content
💡 Proves Viability: Local AI is practical, powerful, and production-ready
- Key Achievements:
- ✅ Fully functional offline RAG system
- ✅ Multi-modal document support (PDF, DOCX, PPTX)
- ✅ Advanced features (PYQ analytics, knowledge graphs, multilingual)
- ✅ Enterprise-grade governance and monitoring
- ✅ Zero-cost deployment model

CONCLUSION & FUTURE SCOPE

- Future Scope
- Short-term Enhancements (3-6 months):
- 🎨 Enhanced UI/UX
- 📱 Mobile Applications
- 🔍 Advanced Search
- 🧠 Improved AI Models
- 📚 Content Generation
- 👥 Collaborative Features
- 🎓 Personalized Learning
- 🔗 Integration Ecosystem
- 🌍 Cloud-Hybrid Mode
- 🧪 Research Applications
- ♿ Accessibility