GARUDEX LABS

Detailed Progress Report - December 2024

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1 Major Achievements

1.1 Smart India Hackathon 2024

- **Competition Success**
  - Won first place in surveillance technology category on PS1604 by BEL
  - Demonstrated real-time anomaly detection system
  - Presented scalable architecture for deployment
  - Received recognition for innovative approach
- **Technical Presentation**
  - Successful demonstration to BEL officials
  - Detailed technical review by DRDO scientist
  - Demonstration with 70.6% accuracy on NextQA
  - Comprehensive architecture explanation

2 Technical Advancements

2.1 Garudavyuha Model Enhancement

- **Video Processing Integration**
  - Implemented temporal attention mechanism
  - Achieved 70.6% accuracy in video analysis
  - Reduced latency to 15 fps for image
  - Achieved 66.3% accuracy in zero-shot understanding
  - Enhanced batch processing capabilities
- **Architecture Improvements**
  - 2B parameters MLLM with image, multi-image, documents and video understanding.
  - Extended query length to 32768 max sequence length
  - Implemented efficient memory management
  - Enhanced feature extraction pipeline
  - Optimized inference performance

2.2 System Performance

**WILL BE DECLARED IN UPCOMING GARUDVYUHA MODEL PAPER in 2025

3 Research Progress

3.1 Advanced Features

- **Long-Term Memory**
  - Developed persistent memory architecture
  - Implemented efficient retrieval system
  - Created memory optimization algorithms

4 Chakravyuha Initiative

4.1 Traffic Management Development

- **Research Foundation**
  - Analyzed traffic flow patterns
  - Analyzed traffic datasets and surveys
  - Studied congestion prediction models
  - Reviewed existing traffic management systems
  - Developed initial architectural design
- **Planned Features**
  - Real-time traffic flow optimization
  - Predictive congestion management
  - Multi-junction coordination
  - Emergency vehicle prioritization

5 January 2025 Objectives

- **Technical Goals**
  - Launch Chakravyuha model development
  - Implement advanced memory systems
  - Enhance video processing capabilities
  - Optimize system performance
- **Research Directions**
  - Explore advanced traffic prediction

- Develop novel optimization algorithms
- Research scalability solutions
- Investigate new use cases