Intelligent Payroll Automation through Multi-Agent NLP and MCP Server Integration

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Abstract

Payroll processing is a mission-critical activity for organizations, yet it often remains hindered by manual workflows, multi-screen navigation, and repetitive tasks that increase operational inefficiencies. Traditional chatbot solutions, commonly built on Retrieval-Augmented Generation (RAG), rely on embedding generation, vector databases, and heavy infrastructure, which limits flexibility and scalability. This paper introduces a novel framework for Intelligent Payroll Automation through the integration of Multi-Agent Natural Language Processing (NLP) with the Model Context Protocol (MCP) Server. The proposed solution enables payroll stakeholders—clients, partners, and administrators—to execute complex payroll activities via natural language commands, eliminating the need for traditional UI navigation. By leveraging multi-agent collaboration, the MCP Server extends beyond data retrieval to support full CRUD operations, ensuring end-to-end automation of payroll tasks. The architecture, implemented using ASP.NET Core, SQL, LangChain, and React, demonstrates how conversational AI can streamline payroll processing, reduce human error, and accelerate client onboarding. Evaluation of this approach highlights its potential to transform enterprise payroll systems into adaptive, intelligent platforms capable of scaling automation without additional infrastructure complexity.