



Artificial Intelligence Framework for Automated Creation of Customized Business Agents for Small Enterprises

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Small and Medium Enterprises (SMEs) are important in the local as well as global economy. However, they face challenges in managing customer communication, sales operations, and inventory due to limited resources and the high cost of advanced technologies like Artificial Intelligence (AI). Most large-scale entrepreneurs use AI-driven solutions such as chatbots and virtual assistants to automate their business operations. However, these systems are too generic and too expensive, and they require technical expertise to manage. Therefore, such expensive methods are unaffordable for small business owners. This research proposes an AI framework for automated creation of customized business agents for small enterprises using Large Language Models (LLMs) and Natural Language Processing (NLP), enabling small business entrepreneurs and solo digital entrepreneurs to create AI agents that meet their specific requirements without any programming knowledge. The system offers a dual-agent architecture consisting of a business owner agent and a customer agent. Together, these agents support tasks such as responding to customer inquiries, handling business updates, retrieving business-specific knowledge, and generating operational insights. Unlike existing solutions that require technical expertise or lack customization, this framework uniquely combines zero-code deployment, dual-agent role specialization, and automated Retrieval-Augmented Generation (RAG) synchronization. The proposed methods involved dataset preparation, business-specific knowledge extraction, prompt-engineering pipelines, agent design, and RAG integration. Several LLMs and different vector databases were compared to select Llama 3.2 as the most suitable LLM and Qdrant as the vector database. The system was evaluated against n8n, a widely adopted workflow automation platform commonly used by SMEs for chatbot deployment, using an e-commerce dataset. Experimental results show the proposed framework achieved a normalized average score of 0.70 across evaluation metrics (BLEU: 0.590, ROUGE-L: 0.664, BERTScore: 0.854) compared to 0.076 for the n8n baseline (BLEU: 0.0105, ROUGE-L: 0.139, BERTScore: 0.078). Overall, the proposed AI framework enhances SME productivity by automating repetitive communication tasks and enabling real-time decision-making, with potential to reduce operational costs by 20–30% while providing 24/7 customer support.

Keywords: AI agents, LLMs, NLP, RAG architecture, SMEs