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LLM Agents for Adaptive Ranking Manipulation: A Framework

Rouzbeh Rezaei Sanjabi

University Of Indianapolis, The United States

Abstract

Conversational search engines, leveraging Large Language Models (LLMs) and Retrieval-Augmented Generation (RAG), synthesize information from web sources to answer user queries. This paradigm introduces vulnerabilities to adversarial ranking manipulation (C-SEO), where crafted content biases LLM responses to favor specific sources. While static attacks like prompt injection and strategic text insertion are known threats, the dynamic nature of search ecosystems demands adaptive strategies. This paper introduces a framework for LLM Agents performing adaptive ranking manipulation. These agents would autonomously monitor search engine outputs, analyze competitor tactics, probe LLM preferences and vulnerabilities through techniques analogous to red teaming, and dynamically adapt website content or injected prompts to maximize visibility in real-time. Synthesizing research on adversarial NLP , RAG security , and competitive dynamics, we outline the architecture and capabilities of such agents.

Keywords: Generative Engine Optimization, Large Language Models, Agents