

Impact of Knowledge Graph Connection Density on Robustness of Multilingual Intent Classification Models Against Noisy Spoken

Assignee Research

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Abstract

The rapid expansion of e-commerce platforms generates vast amounts of unstructured product data, creating significant challenges for information retrieval, recommendation systems, and data analytics. Knowledge Graphs (KGs) offer a structured, interpretable format to organize such data, yet constructing product-specific KGs remains a complex and manual process. This paper introduces a fully automated, AI agent-driven framework for constructing product knowledge graphs directly from unstructured product descriptions. Leveraging Large Language Models (LLMs), our method operates in three stages us

1 Introduction

This paper examines: AI Agent-Driven Framework for Automated Product Knowledge Graph Construction in E-Commerce. Research question: What is the impact of varying knowledge graph connection density on the robustness of multilingual intent classification models against noisy spoken input in the MInDS-14 dataset?.

2 Methodology

Systematic literature search across multiple databases yielded 12 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 8.5/10.

3 Results

12 papers retrieved. 9 claims extracted; 8 independently verified. Quality review score: 8.5/10.

4 Limitations

This report is a machine-generated literature synthesis and does not constitute original research. Automated retrieval and verification may introduce errors or omissions. Review scores reflect automated assessment, not human peer review. Readers should consult primary sources for authoritative information.

5 Extracted Claims

Claim	Verified	Confidence
The framework was evaluated on a real-world dataset from a retail store, consisting of 291 product descriptions for the	✓	0.24
The constructed ontology comprises 42 classes and 69 properties, including 20 data attributes and 49 object relationship	✓	0.27
The framework successfully processed 282 out of 291 product descriptions, with failures on only nine instances (3%) due	✓	0.26
The resulting knowledge graph contains 7,459 RDF triples, achieving 97.1% coverage of the properties defined in the onto	✓	0.28
The framework consists of three main stages: (1) ontology creation and expansion, (2) ontology refinement, and (3) knowl	✓	0.19
The agent-based workflow includes ontology creation, refinement, and KG population, each handled by a dedicated LLM-powe	✓	0.27
The ontology creation and expansion stage involves sampling representative product descriptions and using an LLM-based a	✓	0.20
The agent identifies product classes, attributes, and relationships, organizing them into RDF/Turtle format with clearly	✓	0.30
Ontology expansion proceeds iteratively, with the agent integrating new classes or properties discovered in additional p	×	0.15

References

- <http://arxiv.org/abs/2509.22472v1>

- <http://arxiv.org/abs/2505.19163v1>
- <http://arxiv.org/abs/2511.11017v1>