

# Evaluation Report: Brain Sparks Cognitive Recommender

Rugogamu Noela S23B38/016 B22775  
Institution: Uganda Christian University (UCU)

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## 1. Executive Summary

This report evaluates the performance of Brain Sparks, a cognitive educational recommender system.

### Key Findings:

- Topic identification accuracy: **85%**
- Uganda context detection: **90%**
- Recommendation precision@3: **73%**
- Improvement over baseline: **35%**

## 2. Evaluation Methodology

### 2.2 Evaluation Metrics

Table 1: Evaluation Metrics

Metric	Definition
<b>Topic Accuracy</b>	% of queries with correctly identified primary topic
<b>Context Detection</b>	% of Uganda related queries correctly flagged
<b>Precision@K</b>	% of top K recommendations that are relevant

## 3. Quantitative Results

### 3.1 Topic Identification

Table 2: Topic Identification Accuracy

Query Type	Accuracy	Sample Size
Single topic	92%	12 queries
Multi-topic	75%	8 queries
<b>Overall</b>	<b>85%</b>	20 queries

### 3.3 Recommendation Quality

Table 3: Recommendation Quality Metrics

Metric	Score
Precision@3	73%
Precision@5	68%

## 4. Comparison with Baseline

### 4.1 Precision Comparison

Table 4: Precision Comparison: Brain Sparks vs. Baseline

System	Precision@3	Precision@5
Brain Sparks (Cognitive)	73%	68%
Baseline (Keyword)	45%	42%
<b>Improvement</b>	<b>+62%</b>	<b>+62%</b>

## 5. Qualitative Analysis

### 5.2 System Weaknesses

1. **Cold Start Problem:** New users have no feedback history.
2. **Single Turn Interaction:** Doesn't maintain conversation context.

## 8. Conclusions

### 8.1 Overall Assessment

Brain Sparks successfully demonstrates the four pillars of cognitive computing in an educational context:

- **Understand:** Achieves 85% topic accuracy and 90% context detection.
- **Reason:** Knowledge graph enables intelligent content connections.
- **Learn:** Through feedback
- **Interact:** Through a user friendly streamlit interface

## 9. Appendix: Test Queries

Table 5: Sample Test Queries

Query	Expected Topic	Result	Correct
"Explain quantum computing basics"	quantum_computing	quantum_computing	DONE
"Machine learning for agriculture in Uganda"	machine_learning	machine_learning	DONE
"How to protect mobile money users"	cybersecurity/fintech	cybersecurity	✓