

# MOBA Game Ontology

## League of Legends Chatbot

A League of Legends Gameplay Strategy Assistant

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# Part 1: Knowledge Graph Construction

Transforming complex game data into an intelligent, interconnected network.

## The Problem: Siloed Game Data

### Massive Data Volume

169 champions, 300+ items, thousands of matchups, dynamic synergies.

### Siloed & Disconnected

Traditional storage lacks explicit relationships and inference capabilities.

### Complex Queries

Requires custom programming for intricate data relationships.

# MobaGameOntology Structure: Core Classes and Class Hierarchy

Hero	Playable character entity	Yasuo, Jinx, Thresh
Skill	Hero abilities	Yasuo_Q (Steel Tempest)
Item	Purchasable equipment	Infinity Edge, Zhonya's
Stats	Numerical attributes	Health, Attack Damage

## Hero

MeleeHero, RangedHero, TankHero, CarryHero, MageHero, AssassinHero, SupportHero

## Item

ComponentItem, AdvancedItem, ConsumableItem, OffensiveItem, DefensiveItem, UtilityItem

## Skill

ActiveSkill, PassiveSkill, UltimateSkill, DamageSkill, HealingSkill, CrowdControlSkill

## Objective

Tower, Inhibitor, Ancient (Nexus), NeutralMonster, Boss

# Object Properties: Defining Relationships

## Counters / CounteredBy

Champion defeats another in lane (e.g., Yasuo isCounteredBy Malphite).

## SynergyWith

Symmetric duo synergy (e.g., Jinx synergyWith Thresh).

## CoreItem / SituationalItem

Essential or flexible build items for a hero.

## BuildPath / UpgradesInto

Component requirements and upgrade paths for items.

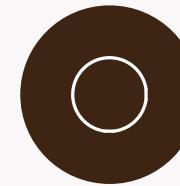
# OWL Reasoning Features

The ontology uses OWL restrictions for automatic classification and inference.



## Inverse Properties

counters and counteredBy are automatic inverses.



## Symmetric Properties

synergyWith works bidirectionally.



## Sub-Properties

hardCounters implies counters.



## Disjoint Classes

MeleeHero and RangedHero are mutually exclusive.

# What We Built: The Knowledge Graph



## Champion Knowledge

Detailed profiles for each hero, including stats and skills.



## Counter Relationships

Explicit links like "Yasuo isCounteredBy Malphite."



## Build Recommendations

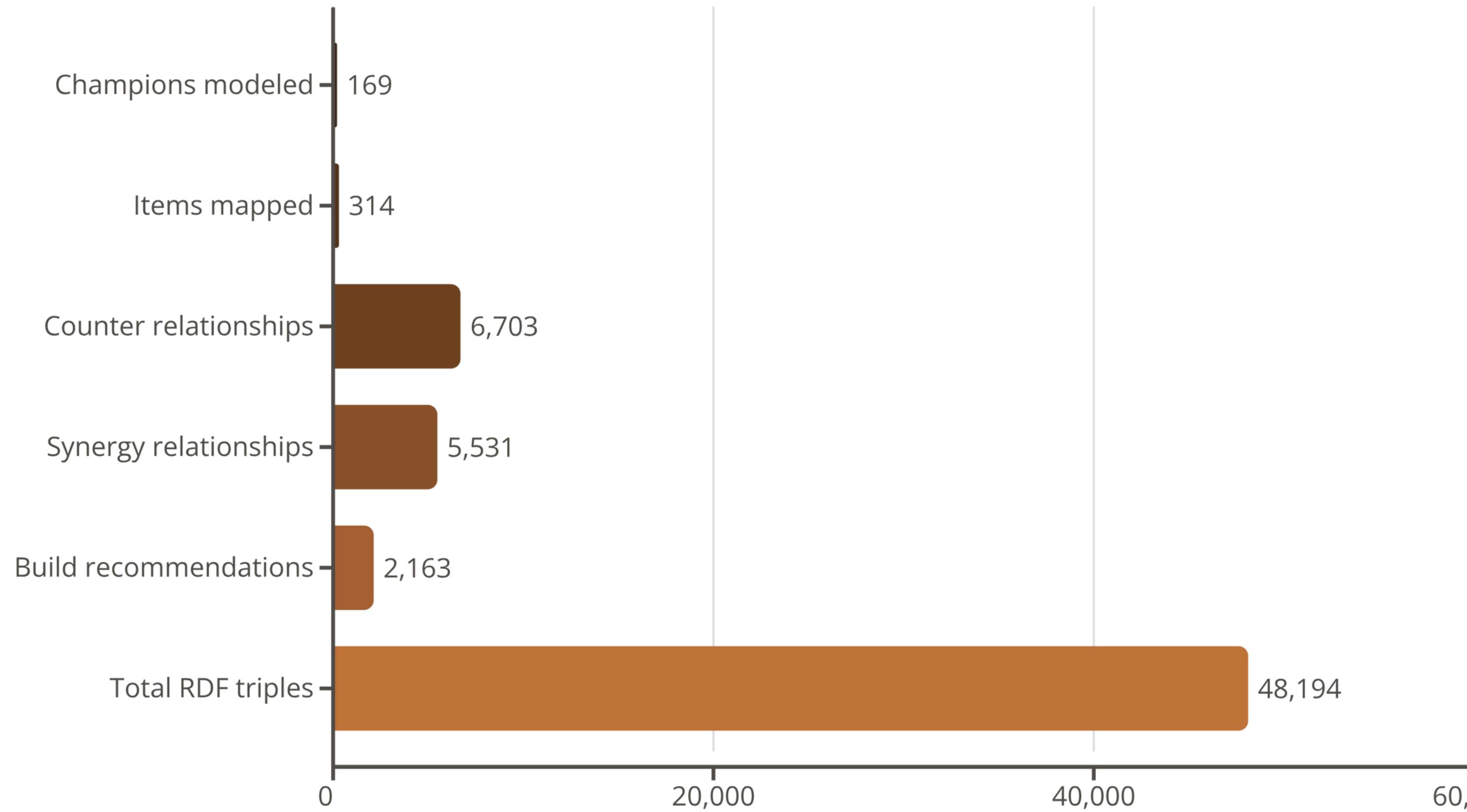
Core and situational items for optimal play.



## Item Build Paths

Clear component requirements for advanced items.

# Quantitative Results





## Part 2: AI Chatbot Application

Leveraging the power of our semantic knowledge graph, we developed an intelligent chatbot to unlock game insights through natural language.



# What Is the Chatbot?

An AI-powered assistant designed to provide accurate, data-driven answers about League of Legends.



## Semantic Knowledge Graph

Utilizes our detailed knowledge graph containing 48,194 RDF triples for rich semantic data.



## SPARQL Queries

Intelligently retrieves data using SPARQL queries, ensuring precise and context-aware results.

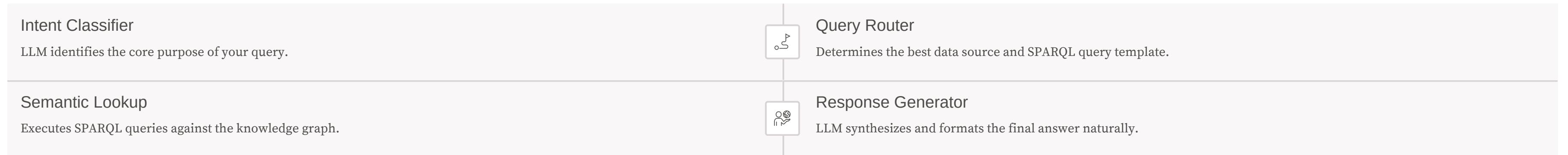


## Large Language Model (LLM)

Leverages LLM for natural language understanding, allowing users to ask questions in plain English.

# How It Works

The chatbot processes your natural language questions through a series of intelligent steps to deliver accurate, data-driven answers.



The screenshot shows a dark-themed chat interface. A user message bubble contains the question: "Which assassins have stealth in their kit?". The AI response bubble below it provides a detailed list of champions and their stealth mechanics, starting with Akali, Akshan, Aurora, Ekko, Evelynn, Kha'Zix, Neeko, Pyke, Qiyana, Rengar, Shaco, Talon, Twitch, and Viego. The response concludes by noting that some champions like Shaco and Evelynn can become invisible for extended periods, while others like Akali and Qiyana use temporary shrouds or camouflage for repositioning or engaging. These stealth mechanics help them excel at surprise attacks and escaping after assassinations.

Ask about champions, items, abilities... >

# What You Can Ask

Our chatbot understands a wide range of questions, from basic champion stats to complex semantic queries about team composition and playstyles.

## Basic Questions

- Champion Stats (e.g., base health)
- Skill Details (e.g., damage, cooldowns)
- Item Information (e.g., cost, effects)
- Direct Counters & Synergies

## Advanced Semantic Questions

- Champion Roles with specific Crowd Control
- Ability Effects & Playstyles
- Power Curve Analysis (early/late game)
- Complex Team Counter & Synergy Analysis

Ask me anything about champions, items, abilities, and more!

Who should I pick to counter enemy team: Yasuo mid, Zed jungle, Jinx ADC?

To counter an enemy team of Yasuo (mid), Zed (jungle), and Jinx (ADC), you should consider picking champions who specifically counter Yasuo and Zed, as they are strong all-in threats. The best options based on counter data are:

- **Fizz**: Counters both Yasuo and Zed with his strong burst, mobility, and ability to dodge their key abilities.
- **Diana**: Matches well into both Yasuo and Zed due to her tankiness, sustained damage, and ability to duel assassins.
- **Xerath**: Keeps Yasuo and Zed at range with poke and crowd control, making it hard for them to engage.
- **Twisted Fate** and **Aurora** are also strong picks, offering map presence and crowd control.

All these picks are effective at shutting down Yasuo and Zed's engage and assassination potential, while also scaling well into teamfights where Jinx is a threat. Consider your playstyle—choose Fizz or Diana for aggressive play, or Xerath/Twisted Fate for safer, utility-focused approaches.

# Generated Sparql Queries by Chatbot for the Given Question

PREFIX moba: <http://www.semanticweb.org/gizemyilmaz/ontologies/moba/ontology#>

1  
SELECT DISTINCT ?counter\_name  
  
WHERE { ?enemy moba:heroName ?enemy\_name .  
        FILTER(LCASE(?enemy\_name) = "yasuo")  
  
        ?enemy moba:counteredBy ?counter .  
  
        ?counter moba:heroName ?counter\_name . }

PREFIX moba: <http://www.semanticweb.org/gizemyilmaz/ontologies/moba/ontology#>

2  
SELECT DISTINCT ?counter\_name  
  
WHERE { ?enemy moba:heroName ?enemy\_name .  
        FILTER(LCASE(?enemy\_name) = "zed")  
  
        ?enemy moba:counteredBy ?counter .  
  
        ?counter moba:heroName ?counter\_name . }

PREFIX moba: <http://www.semanticweb.org/gizemyilmaz/ontologies/moba/ontology#>

3  
SELECT DISTINCT ?counter\_name  
  
WHERE { ?enemy moba:heroName ?enemy\_name .  
        FILTER(LCASE(?enemy\_name) = "jinx")  
  
        ?enemy moba:counteredBy ?counter .  
  
        ?counter moba:heroName ?counter\_name . }

# Example Conversations

Our chatbot excels at both direct inquiries and complex semantic analysis, providing instant, accurate answers.

## Basic Query

**You:** "How much damage does Evelynn's Q do at level 3?"

**Bot:** "Evelynn's Q (Hate Spike) deals 35 magic damage at level 3."

## Semantic Query

**You:** "Which assassins have stealth in their kit?"

**Bot:** "There are 8 assassins with stealth abilities: Akali, Evelynn, Kha'Zix, Shaco, Talon..."

## Team Counter Analysis

**You:** "Who should I pick to counter enemy team: Yasuo mid, Zed jungle, Jinx ADC?"

**Bot:** "Rammus is an excellent counter pick as he counters all three: Yasuo, Zed, and Jinx. Malphite is also strong, countering Yasuo and Jinx..."

# Game Snapshot Analysis

Given the state of the game JSON data, the LLM models the given state on the knowledge graph. Gives user suggestion about the strategies so the user can utilize the game.

The image shows a screenshot of the League of Legends Chatbot interface. At the top, there's a logo consisting of a stylized 'L' inside a blue circle, followed by the text "LEAGUE OF LEGENDS CHATBOT". Below that is a placeholder text "Ask me anything about champions, items, abilities, and more!". A prominent button labeled "Analyze my game snapshot" with a camera icon is visible. The main content area contains several sections with icons and text:

- Game State:** The game is even, with your team just 227 gold behind. Focus on playing smart around objectives and coordinating with your team.
- Lane:** You're losing top lane to Yone (down 17 CS, 1 level, and 1,464 gold). Yone is a soft counter to Mordekaiser—he's stronger right now, so play safely under your tower and avoid fighting him alone.
- Build:** Prioritize buying Mercury's Treads on your next back (you have enough gold), as the enemy team has heavy magic damage and crowd control. After that, look to rush Plated Steelcaps for armor versus Yone and Aatrox, and then core items like Rylai's Crystal Scepter or Riftmaker for sustain and teamfight power.
- Key Threats:** Yone is the main threat—he's ahead and can easily all-in you with his ultimate. Syndra and Aatrox also have strong all-in potential, so respect their power spikes and avoid extended fights unless you have backup.
- Win Condition:** Your team wins by outplaying in skirmishes and teamfights—look for opportunities to catch enemies with your ultimate and follow up with your team, especially with Master Yi.
- Next Steps:** Immediately buy Mercury's Treads, focus on catching up in farm, and avoid risky trades. Ward your jungle entrances, play under tower if needed, and be ready to contest Rift Herald or Dragon if your team has priority.

# User Interfaces and Architecture Summary

## Command Line (CLI)

For direct interaction and scripting, the CLI provides core functionality.

```
python main.py
```

## Web Interface (Streamlit)

A user-friendly web application for interactive exploration and visualization.

```
streamlit run streamlit_app.py
```

### Key Features:

- Chat history
- Debug mode (see SPARQL queries)
- Example questions
- LoL-themed styling

Component	Purpose
ttl_parser.py	Parses RDF data into Python dictionaries
sparql_queries.py	Executes semantic SPARQL queries
intent_classifier.py	LLM-powered intent understanding
data_retriever.py	Routes queries to correct data source
streamlit_app.py	Web interface with chat UI

# Project Summary: What We Achieved

A recap of the key accomplishments and innovations from our League of Legends Semantic Web project, highlighting our core contributions.



## Knowledge Graph Construction

- Transformed raw JSON game data into 48,194 RDF triples.
- Modeled champions, items, counters, synergies, and builds semantically.
- Extended MobaGameOntology with new properties and relationships.

## Query Capabilities

- Developed 10 SPARQL queries demonstrating basic to advanced reasoning.
- Enabled multi-criteria searches (e.g., role + crowd control + lane).
- Supported complex graph traversals (e.g., counter chains, synergy triangles).

## Chatbot Application

- Implemented a natural language interface to the knowledge graph.
- Utilized LLM for intent classification and response generation.
- Provided a Web UI with a debug mode for SPARQL transparency.

Thank You!