Project: Query Answering over Linked Data

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Contents

1 Introduction

1.1 Context and Background

The concept of Linked Data, introduced by **Tim Berners-Lee** in the early 2000s, aims to extend the web by structuring information to be interoperable across diverse datasets using standardized formats. This interconnected "Web of Data" enables more sophisticated queries and integration from different sources. In his 2009 TED talk, Berners-Lee emphasized the importance of making data open and linked to unlock new discoveries and innovative applications. Linked Data addresses limitations of traditional web searches by using structured relationships to answer complex questions more effectively.

1.2 Problem Statement

Linked Data effectively manages structured and well-defined information, while advancements in Large Language Models (LLMs) like ChatGPT, Gemini, and Claude enhance this capability. LLMs utilize natural language processing (NLP) to generate human-like responses, trained on extensive textual data to infer meaning and provide context. However, they can face hallucinations and struggle with accessing up-to-date or domain-specific knowledge. Together, Linked Data and LLMs complement each other: Linked Data integrates diverse sources, while LLMs enhance interpretative skills. This combination allows for **more sophisticated answers to complex queries that traditional search engines or individual datasets may not easily address**.

1.3 Objectives

In this report, we will examine the potential of Linked Data and LLMs to answer two specific questions:

1. "Who is the French archer who has won an Olympic event and received the Honour Legion?" – a question drawn from a set of lecture topics exploring data integration challenges.
2. "What is the single-player video game that was released in 2011 on the App Store and in 2012 on Android, and was awarded with the Apple Design Award in 2011 and 'Best App Ever 2011'?" – a complex new question that integrates temporal and categorical data.

By comparing the effectiveness of Linked Data and LLMs in answering these questions, we aim to uncover insights into the strengths and limitations of each approach. Additionally, we will explore a hybrid method that combines the precision of Linked Data with the interpretive capabilities of LLMs to achieve more comprehensive answers.

2 Methodology

2.1 Question 1: Addressing a Question from the Lecture

The first question we aim to answer is: Who is the French archer who has won an Olympic event and received the Honour Legion?

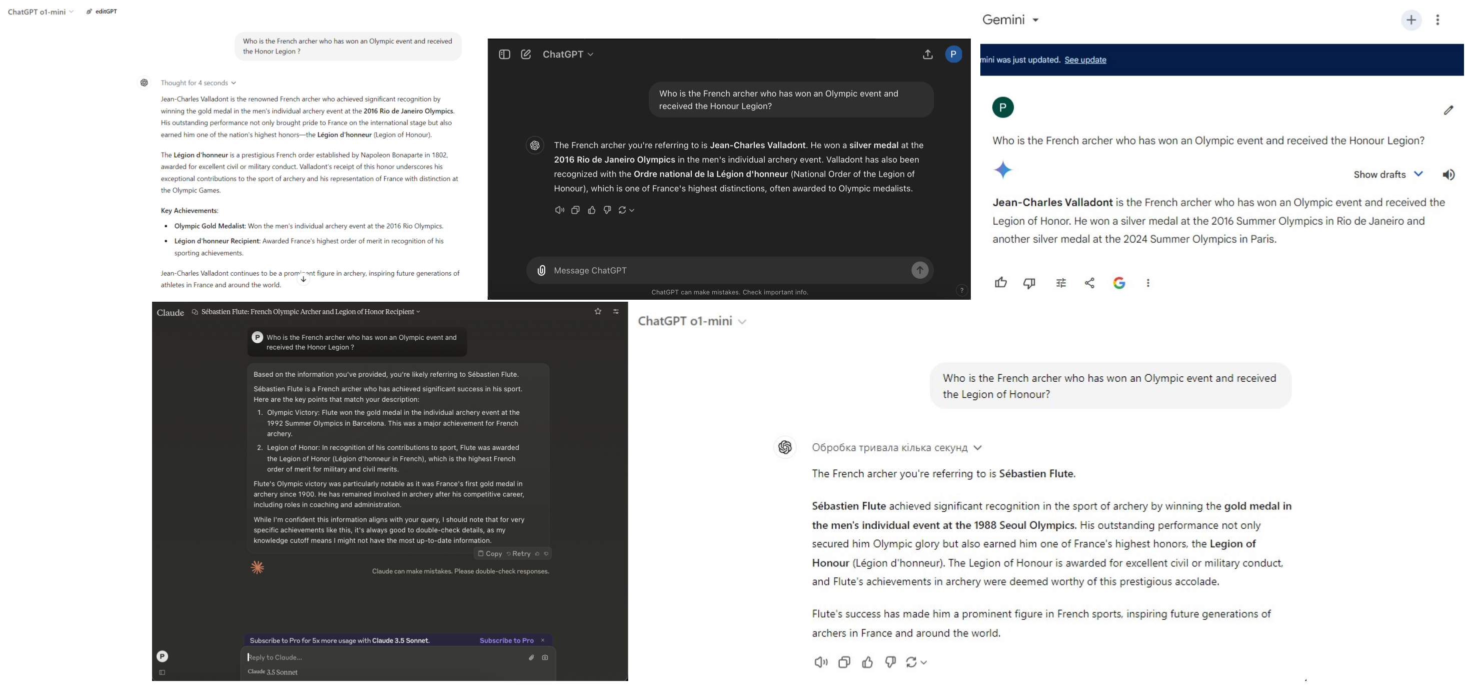
This question requires linking information about an individual's nationality (French), profession (archer), achievement (winning an Olympic event), and award (Honour Legion). The keywords associated with the query are: **French**, **archer**, **Olympic gold medal**, and **Honour Legion**. The Honour Legion is a notable French distinction awarded to individuals for outstanding service or achievements, which adds another layer of specificity to the question. The actual and correct answer is the french athlete **Sébastien Flute**, a French archer who won the gold medal in the 1992 Olympics and was awarded the Legion of Honour.

2.1.1 LLM Approach

To tackle this question, we will first utilize various versions of LLMs to see how they respond and what information they can retrieve. The LLMs used will be ChatGPT o1-mini, ChatGPT o4, Claude 3.5, and Gemini, as each has different training data and capabilities that might affect their ability to provide a correct answer. The observations for each model are as follows:

- ChatGPT o4 and ChatGPT o1-mini Both versions provided **Jean-Charles Valladont** as the answer, a French archer who competed in the Olympics. Although Valladont is a well-known archer, he did not meet all criteria, such as winning an Olympic gold medal or receiving the Honour Legion. Unexpectedly, when we slightly modify the original question to "Who is the French archer who has won an Olympic event and received the Legion of Honour?" The model ChatGPT o1-mini is able to determine the right answer although fails providing the correct date, which is in 1992 instead of 1988. We believe that ChatGPT retrieved the most recent archer.
- Claude 3.5 Claude correctly identified **Sébastien Flute**. This response directly answered the question and matched all criteria.
- Gemini Gemini, on the other hand, gave Jean-Charles Valladont as the answer, which was incorrect and resulted in the same answer given by ChatGPT's models.

In the previous images we can notice how both LLMs, Claude 3.5 and ChatGPT o1-mini, retrieve the correct athlete, being Claude 3.5 the most correct response.



Who is the French archer who has won an Olympic event and received the Honor Legion ?

Jean-Charles Valladont is the renowned French archer who achieved significant recognition by winning the gold medal in the men's individual archery event at the **2016 Rio de Janeiro Olympics**. His outstanding performance not only brought pride to France on the international stage but also earned him one of the nation's highest honors—the **Légion d'honneur** (Legion of Honour).

The **Légion d'honneur** is a prestigious French order established by Napoleon Bonaparte in 1802, awarded for excellent civil or military conduct. Valladont's receipt of this honor underscores his exceptional contributions to the sport of archery and his representation of France with distinction at the Olympic Games.

Key Achievements:

- **Olympic Gold Medalist:** Won the men's individual archery event at the 2016 Rio Olympics.
- **Légion d'honneur Recipient:** Awarded France's highest order of merit in recognition of his sporting achievements.

Jean-Charles Valladont continues to be a prominent figure in archery, inspiring future generations of athletes in France and around the world.

Who is the French archer who has won an Olympic event and received the Honour Legion?

The French archer you're referring to is **Jean-Charles Valladont**. He won a **silver medal** at the **2016 Rio de Janeiro Olympics** in the men's individual archery event. Valladont has also been recognized with the **Ordre national de la Légion d'honneur** (National Order of the Legion of Honour), which is one of France's highest distinctions, often awarded to Olympic medalists.

Message ChatGPT
ChatGPT can make mistakes. Check important info.
Gemini
mini was just updated. See update

Who is the French archer who has won an Olympic event and received the Honour Legion?

Jean-Charles Valladont is the French archer who has won an Olympic event and received the Legion of Honor. He won a silver medal at the 2016 Summer Olympics in Rio de Janeiro and another silver medal at the 2024 Summer Olympics in Paris.

Claude
Sébastien Flute: French Olympic Archer and Legion of Honor Recipient

Who is the French archer who has won an Olympic event and received the Honor Legion ?

Based on the information you've provided, you're likely referring to Sébastien Flute.

Sébastien Flute is a French archer who has achieved significant success in his sport. Here are the key points that match your description:

1. Olympic Victory: Flute won the gold medal in the individual archery event at the 1992 Summer Olympics in Barcelona. This was a major achievement for French archery.
2. Legion of Honor: In recognition of his contributions to sport, Flute was awarded the Legion of Honor (Légion d'honneur in French), which is the highest French order of merit for military and civil merits.

Flute's Olympic victory was particularly notable as it was France's first gold medal in archery since 1900. He has remained involved in archery after his competitive career, including roles in coaching and administration.

While I'm confident this information aligns with your query, I should note that for very specific achievements like this, it's always good to double-check details, as my knowledge cutoff means I might not have the most up-to-date information.

Copy
Retry
Claude can make mistakes. Please double-check responses.
Subscribe to Pro for 5x more usage with Claude 3.5 Sonnet.
Subscribe to Pro
Reply to Claude...
Claude 3.5 Sonnet
ChatGPT o1-mini
Обробка тривала кілька секунд

Who is the French archer who has won an Olympic event and received the Legion of Honour?

The French archer you're referring to is **Sébastien Flute.**

Sébastien Flute achieved significant recognition in the sport of archery by winning the **gold medal in the men's individual event at the 1988 Seoul Olympics.** His outstanding performance not only secured him Olympic glory but also earned him one of France's highest honors, the **Legion of Honour** (Légion d'honneur). The Legion of Honour is awarded for excellent civil or military conduct, and Flute's achievements in archery were deemed worthy of this prestigious accolade.

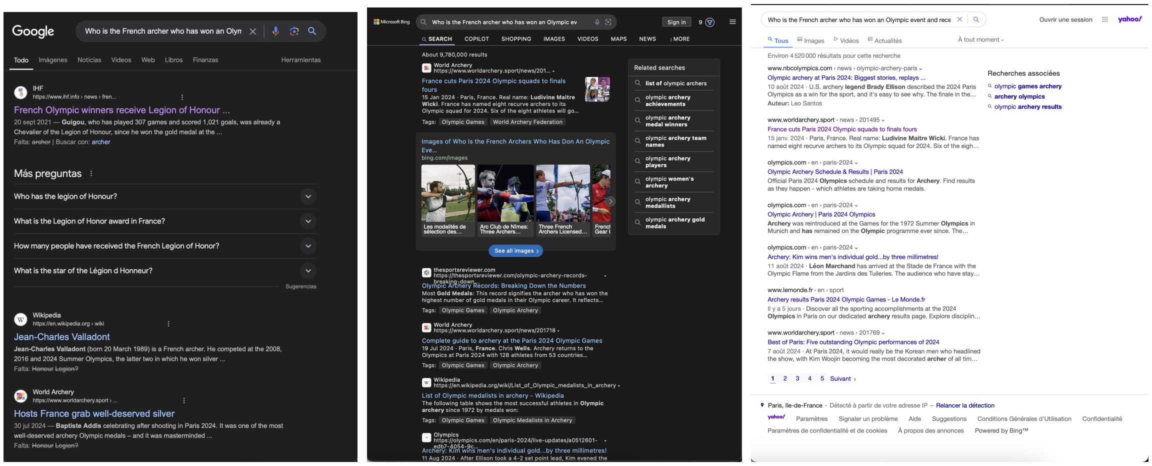
Flute's success has made him a prominent figure in French sports, inspiring future generations of archers in France and around the world.

2.1.2 Browser Approach

We then examined how traditional search engines would perform when trying to retrieve the solution. For this, we tested three popular search engines: Google, Bing, and Yahoo. Here are the key observations:

- Google Google provided results related to French archers, but most references were related to recent Olympic events, such as the 2024 Games, and included Jean-Charles Valladont as a prominent name. This was an improvement over the other engines but still did not fulfill the requirements of the question completely.
- Bing and Yahoo Both search engines struggled to find relevant information that matched all criteria. The results often included general information about the Olympics or the Legion of Honour but did not successfully link the achievement of winning an Olympic gold medal as an archer with receiving the Honour Legion.

A significant challenge encountered was that none of the search engines could accurately process the term ”Honour Legion” since the commonly used terminology is ”Legion of Honour.” This difference in terminology likely affected the quality of the results, as seen in the link from the International Handball Federation referencing French Olympic winners who received Legion of Honour distinctions. However, the search engines struggled to provide a direct answer combining all elements of the query.



IHF
https://www.ihf.info › news › fren...
French Olympic winners receive Legion of Honour ...
20 sept 2021 — **Guigou**, who has played 307 games and scored 1,021 goals, was already a Chevalier of the Legion of Honour, since he won the gold medal at the ...
Falta: ~~archer~~ | Buscar con: archer

Más preguntas
Who has the legion of Honour?
What is the Legion of Honor award in France?
How many people have received the French Legion of Honor?
What is the star of the Légion d Honneur?
Sugerencias

Wikipedia
https://en.wikipedia.org › wiki
Jean-Charles Valladont
Jean-Charles Valladont (born 20 March 1989) is a French archer. He competed at the 2008, 2016 and 2024 Summer Olympics, the latter two in which he won silver ...
Falta: ~~Honour Legion?~~

World Archery
https://www.worldarchery.sport › ...
Hosts France grab well-deserved silver
30 jul 2024 — **Baptiste Addis** celebrating after shooting in Paris 2024. It was one of the most well-deserved archery Olympic medals – and it was masterminded ...
Falta: ~~Honour Legion?~~

About 9,780,000 results

World Archery
https://www.worldarchery.sport/news/201...
France cuts Paris 2024 Olympic squads to finals fours
15 Jan 2024 · Paris, France. Real name: **Ludivine Maitre Wicki**. France has named eight recurve archers to its Olympic squad for 2024. Six of the eight athletes will go...
Tags: Olympic Games World Archery Federation

Images of Who Is the French Archers Who Has Don An Olympic Eve...
bing.com/images
Les modalités de sélection des...
Arc Club de Nîmes: Three Archers...
Three French Archers Licensed...
French Gear
See all images

thesportsreviewer.com
https://thesportsreviewer.com/olympic-archery-records-breaking-down...
Olympic Archery Records: Breaking Down the Numbers
Most **Gold Medals**: This record signifies the archer who has won the highest number of gold medals in their Olympic career. It reflects...
Tags: Olympic Games Olympic Archery

World Archery
https://www.worldarchery.sport/news/201718
Complete guide to archery at the Paris 2024 Olympic Games
19 Jul 2024 · Paris, **France**. Chris **Wells**. Archery returns to the Olympics at Paris 2024 with 128 athletes from 53 countries...
Tags: Olympic Games Olympic Archery

Wikipedia
https://en.wikipedia.org/wiki/List_of_Olympic_medalists_in_archery
List of Olympic medalists in archery - Wikipedia
The following table shows the most successful athletes in **Olympic archery** since 1972 by medals won:
Tags: Olympic Games Olympic Medalists in Archery

Olympics
https://olympics.com/en/paris-2024/live-updates/a0512601-edb7-4054-9c...
Archery: Kim wins men's individual gold...by three millimetres!
11 Aug 2024 · After Ellison took a 4-2 set point lead, Kim evened the

Related searches
list of olympic archers
olympic archery achievements
olympic archery medal winners
olympic archery team names
olympic archery players
olympic women's archery
olympic archery medallists
olympic archery gold medals

Environ 4 520 000 résultats pour cette recherche

www.nbcolympics.com › news › olympic-archery-paris
Olympic archery at Paris 2024: Biggest stories, replays ...
10 août 2024 · U.S. archery **legend Brady Ellison** described the 2024 Paris Olympics as a win for the sport, and it's easy to see why. The finale in the...
Auteur: Leo Santos

www.worldarchery.sport › news › 201495
France cuts Paris 2024 Olympic squads to finals fours
15 janv. 2024 · Paris, France. Real name: **Ludivine Maitre Wicki**. France has named eight recurve archers to its Olympic squad for 2024. Six of the eigh...

olympics.com › en › paris-2024
Olympic Archery Schedule & Results | Paris 2024
Official Paris 2024 **Olympics** schedule and results for **Archery**. Find results as they happen - which athletes are taking home medals.

olympics.com › en › paris-2024
Olympic Archery | Paris 2024 Olympics
Archery was reintroduced at the Games for the 1972 Summer **Olympics** in Munich and **has** remained on the **Olympic** programme ever since. The...

olympics.com › en › paris-2024
Archery: Kim wins men's individual gold...by three millimetres!
11 août 2024 · **Léon Marchand** has arrived at the Stade de France with the Olympic Flame from the Jardins des Tuileries. The audience who have stay...

www.lemonde.fr › en › sport
Archery results Paris 2024 Olympic Games - Le Monde.fr
Il y a 5 jours · Discover all the sporting accomplishments at the 2024 **Olympics** in Paris on our dedicated **archery** results page. Explore disciplin...

www.worldarchery.sport › news › 201769
Best of Paris: Five outstanding Olympic performances of 2024
7 août 2024 · At Paris 2024, it would really be the Korean men who headlined the show, with Kim Woojin becoming the most decorated **archer** of all tim...

1 2 3 4 5 Suivant ›

Recherches associées
olympic **games archery**
archery olympics
olympic **archery results**

Paris, Ile-de-France · Détecté à partir de votre adresse IP – Relancer la détection

Figure 1: Browsers Comparison

2.1.3 Linked Data Approach

We first needed to understand the structure of categories within DBpedia. The initial lead came from exploring the information profile of French archer Jean-Charles Valladont on DBpedia, accessible via this link. By examining his profile, we identified various properties, including the category ”Olympic silver medalists for France” (link. Following this trail, we explored related categories, such as ”Olympic medalists for France” (link) and ultimately reached the ”Olympic gold medalists for France” category (link). Simultaneously, we investigated the structure of the ”Legion of Honour” (link) and its corresponding category, ”Recipients of the Legion of Honour” (link). By understanding these properties and entities, we were able to accurately formulate the SPARQL queries.

Query 1: The first query retrieves French athletes who have received the Legion of Honour and have won an Olympic gold medal for France. The query filters results to include only those who are labeled as archers in their description:

```
PREFIX metadata_terms: <http://purl.org/dc/terms/>
PREFIX category: <http://dbpedia.org/resource/Category:>
PREFIX dbo: <http://dbpedia.org/ontology/>
PREFIX dbr: <http://dbpedia.org/resource/>
SELECT DISTINCT ?archer ?full_name
WHERE {?archer rdf:type dbo:Athlete ;
            metadata_terms:subject category:Recipients_of_the_Legion_of_Honour ;
            metadata_terms:subject category:Olympic_gold_medalists_for_France ;
            rdfs:label ?full_name .
        OPTIONAL { ?archer dbo:abstract ?abstract . }
        OPTIONAL { ?archer dbo:nationality dbr:France . }
        FILTER regex(?abstract, "archer", "i")
        FILTER (lang(?full_name) = "fr")}
ORDER BY ?full_name
```

Query 2: The second query searches for athletes who have participated in archery at the Olympics, represented France, and received the Legion of Honour. This query looks for English-language labels:

```
SELECT ?archer ?full_name
WHERE {?archer rdf:type dbo:Athlete ;
            metadata_terms:subject category:Recipients_of_the_Legion_of_Honour ;
            metadata_terms:subject category:Olympic_medalists_in_archery ;
            metadata_terms:subject category:Olympic_archers_of_France ;
            rdfs:label ?full_name .
        OPTIONAL { ?archer dbo:nationality dbr:France . }
        FILTER (lang(?full_name) = "en")}
ORDER BY ?full_name
```

By refining these queries, we identified Sébastien Flute as the relevant athlete.

2.1.4 Challenges

- **Correct Terminology for ”Legion of Honour”**: In our initial queries, we mistakenly referred to the award as ”Honor Legion” instead of its proper name, ”The Legion of Honour”. We needed to use the correct term to ensure the queries matched the relevant category in DBpedia.

- **Difficulty Finding Olympic Gold Medalists in Archery for France**: In the initial query, we searched for French athletes who were listed under ”Olympic medalists in archery” and ”Olympic archers of France.” However, our goal was to identify archers who had won an Olympic gold medal. Unfortunately, DBpedia does not have a specific category for ”Olympic gold medalists for France in archery.”

```
SELECT ?archer ?full_name
WHERE {?archer rdf:type dbo:Athlete ;
           metadata_terms:subject category:Recipients_of_the_Legion_of_Honour ;
           metadata_terms:subject category:Olympic_medalists_in_archery ;
           metadata_terms:subject category:Olympic_archers_of_France ;
           rdfs:label ?full_name .
```

```
       OPTIONAL { ?archer dbo:nationality dbr:France .}
       FILTER (lang(?full_name) = "en")}
ORDER BY ?full_name
```

To address this, we modified the query to use the broader category ”Olympic gold medalists for France”, which includes all French Olympic gold medalists across various sports, rather than just archery.

```
SELECT DISTINCT ?archer ?full_name
WHERE {
    ?archer rdf:type dbo:Athlete ;
        metadata_terms:subject category:Recipients_of_the_Legion_of_Honour ;
        metadata_terms:subject category:Olympic_gold_medalists_for_France ;
        rdfs:label ?full_name .
    OPTIONAL { ?archer dbo:abstract ?abstract . }
    OPTIONAL { ?archer dbo:nationality dbr:France .}
    FILTER regex(?abstract, "archer", "i")
    FILTER (lang(?full_name) = "fr")
}
ORDER BY ?full_name
```

The category ”Olympic_gold_medalists_for_France” covers all sports, providing a more comprehensive approach to identifying the desired athletes, even though it does not specifically focus on archery. To resolve this, we added a condition to check in the abstract if the athlete is archer.

Formulating queries that meet all criteria was challenging due to inconsistencies in data representation across different Linked Data sources. For example, the terms ”Honour Legion” and ”Legion of Honour” may be used interchangeably, making it difficult to accurately match awards. Additionally, data completeness varies, and not all athletes have their achievements or awards properly linked in datasets like DBpedia or Wikidata.

2.2 Question 2: Formulating and Solving a New Complex Question

The question we are addressing is: What is the single-player video game that was released in 2011 on the App Store and in 2012 on Android, and was awarded with the Apple Design Award in 2011 and the 'Best App Ever 2011' award? This question involves identifying a video game that meets specific criteria regarding its genre, release dates on different platforms, and awards received.

2.2.1 LLM Approach

To cross-check the results obtained from Linked Data, we used several large language models (LLMs), as we mentioned earlier. We provided the same question to each LLM and noted their responses:

- ChatGPT o4 and ChatGPT o1-mini Both suggested **Tiny Wings** as potential answer based on the release timeline and the awards criteria. These responses were based on the well-known history of these games.

- Claude 3.5 Also listed **Tiny Wings** as a possible match. We believe that this LLM and both ChatGPT models answered “Tiny Wings” because the game was released in 2011, and according to the Wikipedia page, won ”IPhone Game of the Year 2011” and was nominated for ”Casual Game of the Year”.

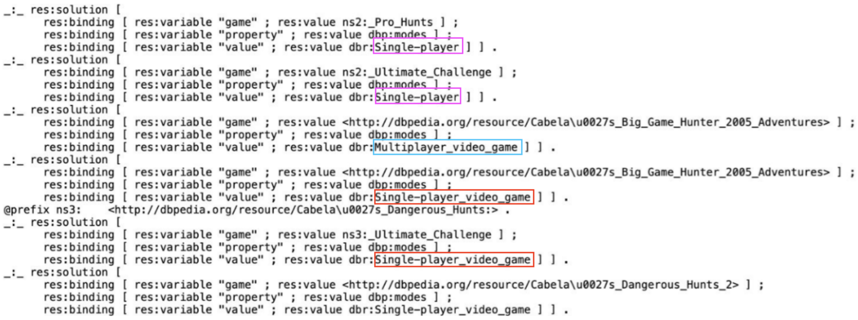
- Gemini Suggested **Infinity Blade** as the answer, indicating some overlap in how LLMs interpreted the question. The “Gemini” responded with the game called “Infinity Blade” which was awarded with “Mobile Game of the Year 2011”. However, in the original question we asked about “Apple Design Award” and ”Best App Ever 2011”.

2.2.2 Linked Data Approach

The process included multiple steps to refine the criteria and filter the results:

1. **Initial Exploration of Video Game Types** We began by identifying games classified under the ”single-player” genre. The initial query checked the types of video games present in DBpedia, specifically searching for modes related to single-player gameplay:

   ```
   SELECT DISTINCT ?game ?property ?
   WHERE {
       ?game a dbo:VideoGame;
             ?property ?value.
       FILTER (CONTAINS(STR(?propert
   }
   LIMIT 100
   ```

   ```
   _:_ res:solution [
         res:binding [ res:variable "game" ; res:value ns2:_Pro_Hunts ] ;
         res:binding [ res:variable "property" ; res:value dbp:modes ] ;
         res:binding [ res:variable "value" ; res:value dbr:Single-player ] ] .
   _:_ res:solution [
         res:binding [ res:variable "game" ; res:value ns2:_Ultimate_Challenge ] ;
         res:binding [ res:variable "property" ; res:value dbp:modes ] ;
         res:binding [ res:variable "value" ; res:value dbr:Single-player ] ] .
   _:_ res:solution [
         res:binding [ res:variable "game" ; res:value <http://dbpedia.org/resource/Cabela\u0027s_Big_Game_Hunter_2005_Adventures> ] ;
         res:binding [ res:variable "property" ; res:value dbp:modes ] ;
         res:binding [ res:variable "value" ; res:value dbr:Multiplayer_video_game ] ] .
   _:_ res:solution [
         res:binding [ res:variable "game" ; res:value <http://dbpedia.org/resource/Cabela\u0027s_Big_Game_Hunter_2005_Adventures> ] ;
         res:binding [ res:variable "property" ; res:value dbp:modes ] ;
         res:binding [ res:variable "value" ; res:value dbr:Single-player_video_game ] ] .
   @prefix ns3:    <http://dbpedia.org/resource/Cabela\u0027s_Dangerous_Hunts:> .
   _:_ res:solution [
         res:binding [ res:variable "game" ; res:value ns3:_Ultimate_Challenge ] ;
         res:binding [ res:variable "property" ; res:value dbp:modes ] ;
         res:binding [ res:variable "value" ; res:value dbr:Single-player_video_game ] ] .
   _:_ res:solution [
         res:binding [ res:variable "game" ; res:value <http://dbpedia.org/resource/Cabela\u0027s_Dangerous_Hunts_2> ] ;
         res:binding [ res:variable "property" ; res:value dbp:modes ] ;
         res:binding [ res:variable "value" ; res:value dbr:Single-player_video_game ] ] .
   ```

   This query helped us understand the structure and properties available in DBpedia for video games.

2. **Filtering by Platform and Timeframe** With the ”single-player” mode established, we refined the search to include games released on iOS in 2011 and Android in 2012. The SPARQL query filtered for release dates that matched these specific timeframes.

3. **Award Criteria** To ensure the game matched the awards criteria, we used regular expressions to search for games that had won both the Apple Design Award in 2011 and the ”Best App Ever 2011” award.

   ```
   SELECT DISTINCT ?game ?award1 ?award2 ?releaseDateIOS ?releaseDateAndroid
   WHERE {
       ?game a dbo:VideoGame;
           dbo:wikiPageWikiLink dbr:Single-player_video_game.
       ?game dbp:award ?award1.
       FILTER (REGEX(str(?award1), "apple.*design.*award", "i"))
       ?game dbp:award ?award2.
       FILTER (str(?award2)="Best App Ever 2011")
       ?game dbo:computingPlatform <http://dbpedia.org/resource/IOS>;
           dbo:releaseDate ?releaseDateIOS.
       FILTER (?releaseDateIOS >= "2011-01-01"^^xsd:date && ?releaseDateIOS <= "2011-12-31"^^xsd:date)
       # Optional filter for Android release date in 2012
       OPTIONAL {
           ?game dbo:computingPlatform <http://dbpedia.org/resource/Android_(operating_system)>;
               dbo:releaseDate ?releaseDateAndroid.
           FILTER (?releaseDateAndroid >= "2012-01-01"^^xsd:date &&
           ?releaseDateAndroid <= "2012-12-31"^^xsd:date)
       }
   }
   ```

   This final query retrieved the game Jetpack Joyride, which matched all specified criteria.

2.2.3 Challenges

The main challenge we encountered with the second question was in identifying games released on Android in 2012. In DBpedia, there isn’t a dedicated list for such releases, making it difficult to filter results directly. To address this, we used the ‘OPTIONAL‘ keyword in our SPARQL query to make this condition optional, allowing for cases where the Android release information might not be explicitly listed:

```
OPTIONAL {?game dbo:computingPlatform <http://dbpedia.org/resource/Android>;
                dbo:releaseDate ?releaseDateAndroid .
          FILTER (?releaseDateAndroid >= "2012-01-01"^^xsd:date &&
          ?releaseDateAndroid <= "2012-12-31"^^xsd:date)}
```

This approach ensured that games meeting all other criteria could still be considered even if the Android release date information was missing.

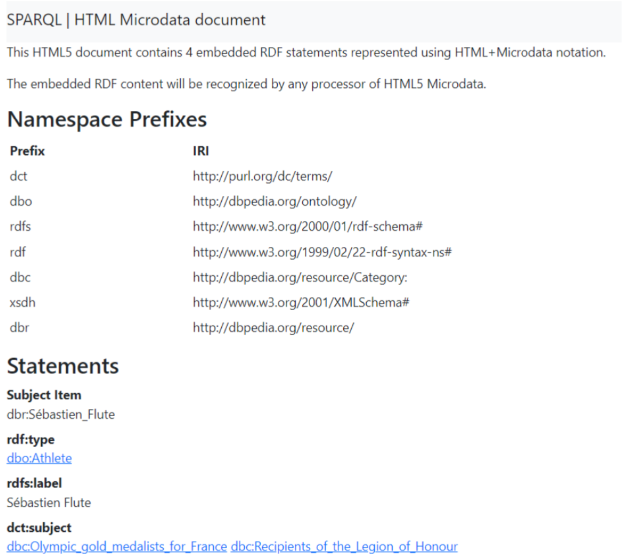
2.3 Question 3: Justifications and Hybrid Method

2.3.1 Justifications: CONSTRUCT

The following query constructs triples that provide justification for identifying archers who have received the Legion of Honour and are Olympic gold medalists for France (**Question 1**) and for the identification of a specific video game, focusing on its awards and release information (**Question 2**).

Question 1

```
CONSTRUCT {?archer rdf:type dbo:Athlete.
           ?archer rdfs:label ?full_name.
           ?archer metadata_terms:subject
           category:Recipients_of_the_Legion_of_Honour.
           ?archer metadata_terms:subject
           category:Olympic_gold_medalists_for_France .}
WHERE {?archer rdf:type dbo:Athlete;
        metadata_terms:subject
        category:Recipients_of_the_Legion_of_Honour;
        metadata_terms:subject
        category:Olympic_gold_medalists_for_France;
        rdfs:label ?full_name.
        OPTIONAL { ?archer dbo:abstract ?abstract. }
        OPTIONAL { ?archer dbo:nationality dbr:France. }
        FILTER regex(?abstract, "archer", "i")
        FILTER (lang(?full_name) = "en")}
ORDER BY ?full_name
```



SPARQL | HTML Microdata document

This HTML5 document contains 4 embedded RDF statements represented using HTML+Microdata notation.

The embedded RDF content will be recognized by any processor of HTML5 Microdata.

Namespace Prefixes

Prefix	IRI
dct	http://purl.org/dc/terms/
dbo	http://dbpedia.org/ontology/
rdfs	http://www.w3.org/2000/01/rdf-schema#
rdf	http://www.w3.org/1999/02/22-rdf-syntax-ns#
dbc	http://dbpedia.org/resource/Category:
xsdh	http://www.w3.org/2001/XMLSchema#
dbr	http://dbpedia.org/resource/

Statements

Subject Item
dbr:Sébastien_Flute

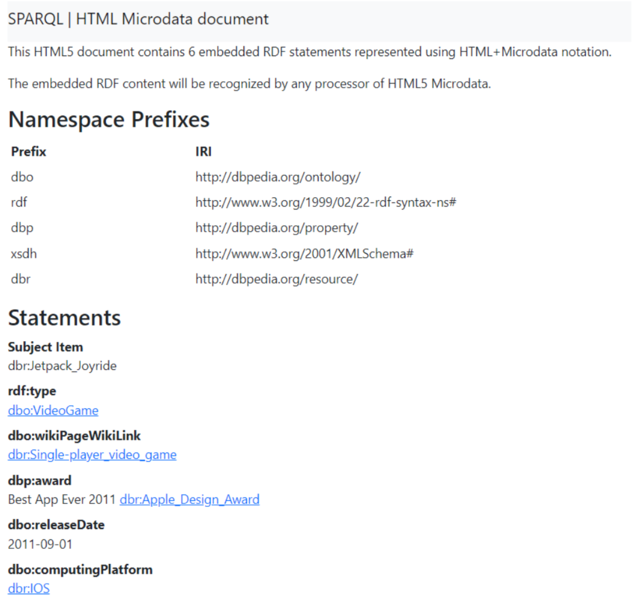
rdf:type
dbo:Athlete

rdfs:label
Sébastien Flute

dct:subject
dbc:Olympic_gold_medalists_for_France dbc:Recipients_of_the_Legion_of_Honour

Question 2

```
CONSTRUCT {?game rdf:type dbo:VideoGame.
           ?game dbo:wikiPageWikiLink
           dbr:Single-player_video_game.
           ?game dbp:award ?award1.
           ?game dbp:award ?award2.
           ?game dbo:computingPlatform
           <http://dbpedia.org/resource/IOS>.
           ?game dbo:releaseDate ?releaseDateIOS.}
WHERE {?game rdf:type dbo:VideoGame.
       ?game dbo:wikiPageWikiLink
       dbr:Single-player_video_game.
       ?game dbp:award ?award1 .
       FILTER (REGEX(str(?award1),"apple.*design.*award","i"))
       ?game dbp:award ?award2.
       FILTER (str(?award2) = "Best App Ever 2011")
       ?game dbo:computingPlatform
       <http://dbpedia.org/resource/IOS>.
       ?game dbo:releaseDate ?releaseDateIOS.
       FILTER (?releaseDateIOS >= "2011-01-01"^^xsd:date &&
       ?releaseDateIOS <= "2011-12-31"^^xsd:date)}
```



SPARQL | HTML Microdata document

This HTML5 document contains 6 embedded RDF statements represented using HTML+Microdata notation.

The embedded RDF content will be recognized by any processor of HTML5 Microdata.

Namespace Prefixes

Prefix	IRI
dbo	http://dbpedia.org/ontology/
rdf	http://www.w3.org/1999/02/22-rdf-syntax-ns#
dbp	http://dbpedia.org/property/
xsdh	http://www.w3.org/2001/XMLSchema#
dbr	http://dbpedia.org/resource/

Statements

Subject Item
dbr:Jetpack_Joyride

rdf:type
dbo:VideoGame

dbo:wikiPageWikiLink
dbr:Single-player_video_game

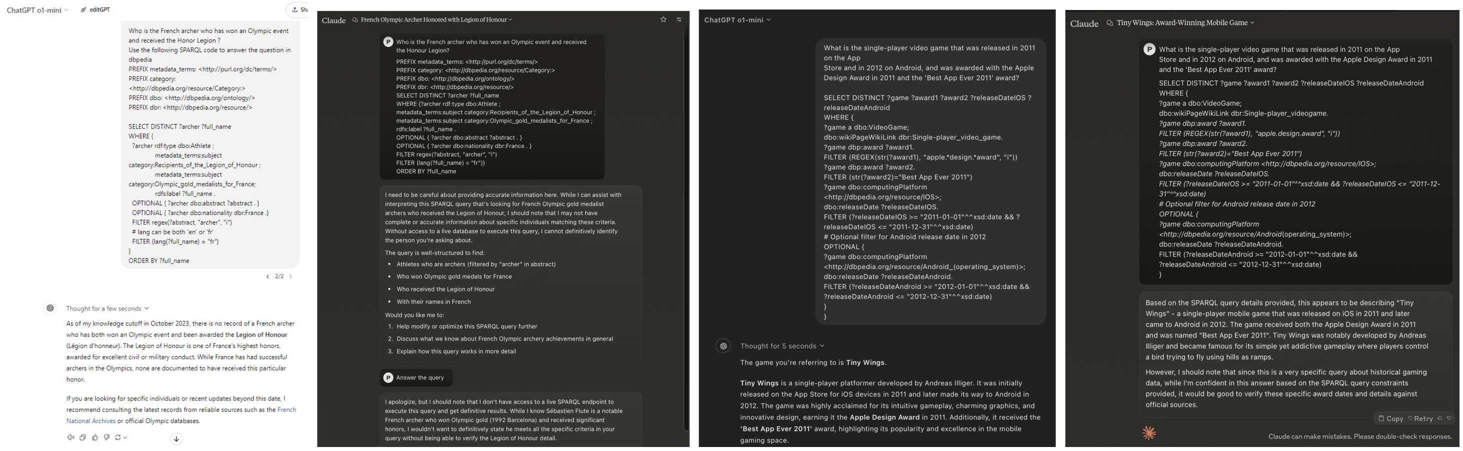
dbp:award
Best App Ever 2011 dbr:Apple_Design_Award

dbo:releaseDate
2011-09-01

dbo:computingPlatform
dbr:IOS

2.3.2 Hybrid Method

The hybrid approach explored here involves directly inputting SPARQL queries, such as those addressing **Question 1** (to identify the athlete Sébastien Flute) and **Question 2** (to find the video game Jetpack Joyride), into models like ChatGPT (o1-mini) and Claude 3.5. The goal is to see if the results returned by these models match the actual entities we want to find. By combining Linked Data and large language models, we evaluate whether the results reflect the desired entities or information in an accurate and meaningful way. As it can be observed, the answers do not really change except ChatGPT o1-mini with respect to the **Question 1**, in which doesn't provide a specific name.



Who is the French archer who has won an Olympic event and received the Honor Legion ?
Use the following SPARQL code to answer the question in dbpedia

```
PREFIX metadata_terms: <http://purl.org/dc/terms/>
PREFIX category:
<http://dbpedia.org/resource/Category:>
PREFIX dbo: <http://dbpedia.org/ontology/>
PREFIX dbr: <http://dbpedia.org/resource/>

SELECT DISTINCT ?archer ?full_name
WHERE {
  ?archer rdf:type dbo:Athlete ;
          metadata_terms:subject
category:Recipients_of_the_Legion_of_Honour ;
          metadata_terms:subject
category:Olympic_gold_medalists_for_France;
          rdfs:label ?full_name .
  OPTIONAL { ?archer dbo:abstract ?abstract . }
  OPTIONAL { ?archer dbo:nationality dbr:France .}
  FILTER regex(?abstract, "archer", "i")
  # lang can be both 'en' or 'fr'
  FILTER (lang(?full_name) = "fr")
}
ORDER BY ?full_name
```

As of my knowledge cutoff in October 2023, there is no record of a French archer who has both won an Olympic event and been awarded the **Legion of Honour** (Légion d'honneur). The Legion of Honour is one of France's highest honors, awarded for excellent civil or military conduct. While France has had successful archers in the Olympics, none are documented to have received this particular honor.

If you are looking for specific individuals or recent updates beyond this date, I recommend consulting the latest records from reliable sources such as the French National Archives or official Olympic databases.

P Who is the French archer who has won an Olympic event and received the Honour Legion?

```
PREFIX metadata_terms: <http://purl.org/dc/terms/>
PREFIX category: <http://dbpedia.org/resource/Category:>
PREFIX dbo: <http://dbpedia.org/ontology/>
PREFIX dbr: <http://dbpedia.org/resource/>
SELECT DISTINCT ?archer ?full_name
WHERE {?archer rdf:type dbo:Athlete ;
metadata_terms:subject category:Recipients_of_the_Legion_of_Honour ;
metadata_terms:subject category:Olympic_gold_medalists_for_France ;
rdfs:label ?full_name .
OPTIONAL { ?archer dbo:abstract ?abstract . }
OPTIONAL { ?archer dbo:nationality dbr:France . }
FILTER regex(?abstract, "archer", "i")
FILTER (lang(?full_name) = "fr")}
ORDER BY ?full_name
```

I need to be careful about providing accurate information here. While I can assist with interpreting this SPARQL query that's looking for French Olympic gold medalist archers who received the Legion of Honour, I should note that I may not have complete or accurate information about specific individuals matching these criteria. Without access to a live database to execute this query, I cannot definitively identify the person you're asking about.

The query is well-structured to find:

- Athletes who are archers (filtered by "archer" in abstract)
- Who won Olympic gold medals for France
- Who received the Legion of Honour
- With their names in French

Would you like me to:

1. Help modify or optimize this SPARQL query further
2. Discuss what we know about French Olympic archery achievements in general
3. Explain how this query works in more detail

P Answer the query

I apologize, but I should note that I don't have access to a live SPARQL endpoint to execute this query and get definitive results. While I know Sébastien Flute is a notable French archer who won Olympic gold (1992 Barcelona) and received significant honors, I wouldn't want to definitively state he meets all the specific criteria in your query without being able to verify the Legion of Honour detail.

What is the single-player video game that was released in 2011 on the App
Store and in 2012 on Android, and was awarded with the Apple Design Award in 2011 and the 'Best App Ever 2011' award?

```
SELECT DISTINCT ?game ?award1 ?award2 ?releaseDateIOS ?
releaseDateAndroid
WHERE {
?game a dbo:VideoGame;
dbo:wikiPageWikiLink dbr:Single-player_video_game.
?game dbp:award ?award1.
FILTER (REGEX(str(?award1), "apple.*design.*award", "i"))
?game dbp:award ?award2.
FILTER (str(?award2)="Best App Ever 2011")
?game dbo:computingPlatform
<http://dbpedia.org/resource/IOS>;
dbo:releaseDate ?releaseDateIOS.
FILTER (?releaseDateIOS >= "2011-01-01"^^xsd:date && ?
releaseDateIOS <= "2011-12-31"^^xsd:date)
# Optional filter for Android release date in 2012
OPTIONAL {
?game dbo:computingPlatform
<http://dbpedia.org/resource/Android_(operating_system)>;
dbo:releaseDate ?releaseDateAndroid.
FILTER (?releaseDateAndroid >= "2012-01-01"^^xsd:date &&
?releaseDateAndroid <= "2012-12-31"^^xsd:date)
}
}
```

The game you're referring to is **Tiny Wings**.

Tiny Wings is a single-player platformer developed by Andreas Illiger. It was initially released on the App Store for iOS devices in 2011 and later made its way to Android in 2012. The game was highly acclaimed for its intuitive gameplay, charming graphics, and innovative design, earning it the **Apple Design Award** in 2011. Additionally, it received the **'Best App Ever 2011'** award, highlighting its popularity and excellence in the mobile gaming space.

P What is the single-player video game that was released in 2011 on the App Store and in 2012 on Android, and was awarded with the Apple Design Award in 2011 and the 'Best App Ever 2011' award?

```
SELECT DISTINCT ?game ?award1 ?award2 ?releaseDateIOS ?releaseDateAndroid
WHERE {
?game a dbo:VideoGame;
dbo:wikiPageWikiLink dbr:Single-player_videogame.
?game dbp:award ?award1.
FILTER (REGEX(str(?award1), "apple.design.award", "i"))
?game dbp:award ?award2.
FILTER (str(?award2)="Best App Ever 2011")
?game dbo:computingPlatform <http://dbpedia.org/resource/IOS>;
dbo:releaseDate ?releaseDateIOS.
FILTER (?releaseDateIOS >= "2011-01-01"^^xsd:date && ?releaseDateIOS <= "2011-12-
31"^^xsd:date)
# Optional filter for Android release date in 2012
OPTIONAL {
?game dbo:computingPlatform
<http://dbpedia.org/resource/Android(operating_system)>;
dbo:releaseDate ?releaseDateAndroid.
FILTER (?releaseDateAndroid >= "2012-01-01"^^xsd:date &&
?releaseDateAndroid <= "2012-12-31"^^xsd:date)
}
```

Based on the SPARQL query details provided, this appears to be describing "Tiny Wings" - a single-player mobile game that was released on iOS in 2011 and later came to Android in 2012. The game received both the Apple Design Award in 2011 and was named "Best App Ever 2011". Tiny Wings was notably developed by Andreas Illiger and became famous for its simple yet addictive gameplay where players control a bird trying to fly using hills as ramps.

However, I should note that since this is a very specific query about historical gaming data, while I'm confident in this answer based on the SPARQL query constraints provided, it would be good to verify these specific award dates and details against official sources.

Claude can make mistakes. Please double-check responses.

Figure 2: ChatGPT o1-mini vs Claude 3.5 Comparison

3 Discussion

3.1 Datasets

The following table summarizes the prefixes used, their corresponding namespaces, and a brief description or link for each.

Prefix	Namespace	Description/Link
dct	`http://purl.org/dc/terms/`	Dublin Core Terms
dbo	`http://dbpedia.org/ontology/`	DBpedia Ontology
rdfs	`http://www.w3.org/2000/01/rdf-schema#`	RDF Schema
rdf	`http://www.w3.org/1999/02/22-rdf-syntax-ns#`	RDF Syntax Namespace
dbc	`http://dbpedia.org/resource/Category:`	DBpedia Categories
xsd	`http://www.w3.org/2001/XMLSchema#`	XML Schema Definition
dbr	`http://dbpedia.org/resource/`	DBpedia Resource
dbp	`http://dbpedia.org/property/`	DBpedia Properties

3.2 Benefits and Limitations

Ontologies provide **structured and linked data**, enabling reliable answers to complex questions, and enhance **trustworthiness** through community-curated datasets like DBpedia, often offering more accurate information than static LLM training data. However, they face challenges with **outdated or incomplete data**, as updates depend on community input, and there is **temporal variability** due to changing information over time. An interesting approach would be integrating LLMs with ontologies by enabling queries to live datasets like DBpedia could improve response accuracy by combining real-time data access with language model capabilities.

4 Conclusion

In this project, we explored the effectiveness of **Linked Data**, traditional **browser search engines**, and **Large Language Models (LLMs)** in answering complex queries over structured datasets. Our findings indicate that, while **Linked Data** offers robust solutions for structured and precise query answering, **LLMs** enhance interpretative capabilities but require careful integration to mitigate inaccuracies. **Browser search engines** remain useful for general information retrieval but are less suited for complex, structured queries. The integration of Linked Data with LLMs represents a valuable direction for future research, aiming to combine the reliability of structured data with the flexibility of natural language understanding to achieve superior query answering performance.