Homework 1

Skyler Dale
sdale31@gatech.edu

1 SEMANTIC NETWORKS AND GENERATE AND TEST

Below is a solution for representing the star wars state problem as a semantic network and solving it using generate and test.

1.1 Representing States with a Semantic Network

In order to represent the star wars problem as a semantic network I use the following components in Figure 1:

1. Text marker to represent each side of the problem (Quesh and Ship)
2. Text marker to represent each of the characters (Rey, Snoke, and Kylo)
3. Shuttle icon and arrow to represent the position of ship
4. Character initial marker and arrow to represent the operator that transitions between states. If there is no character marker with the arrow, then only the shuttle has been moved.
5. State number in the bottom right-hand corner to keep track of past states.

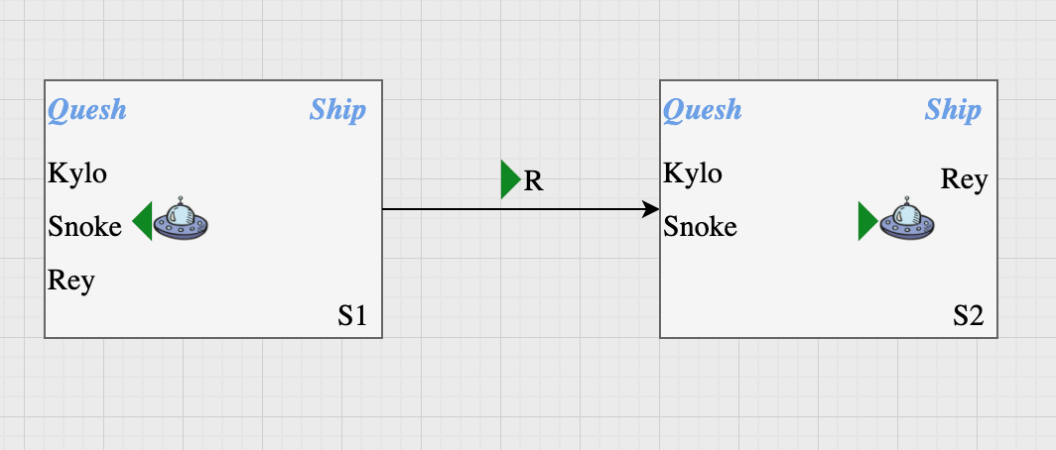

Figure 1— Semantic network that represents the change in states as Rey is moved on the shuttle from Quesh to the ship

1.2 Leveraging Generate and Test to Solve the Problem

In order to solve the star wars problem with generate and test I assign the following responsibilities to each function:

1. **Generate function**: Generate all possible states, excluding previously visited ones, which are marked with a green highlight.
2. **Test function**: Identify states that violate the rules *and* those that are non-optimal. These are marked with a red X in figure 2 and accompanied by a blue-highlighted description for why the state was flagged.

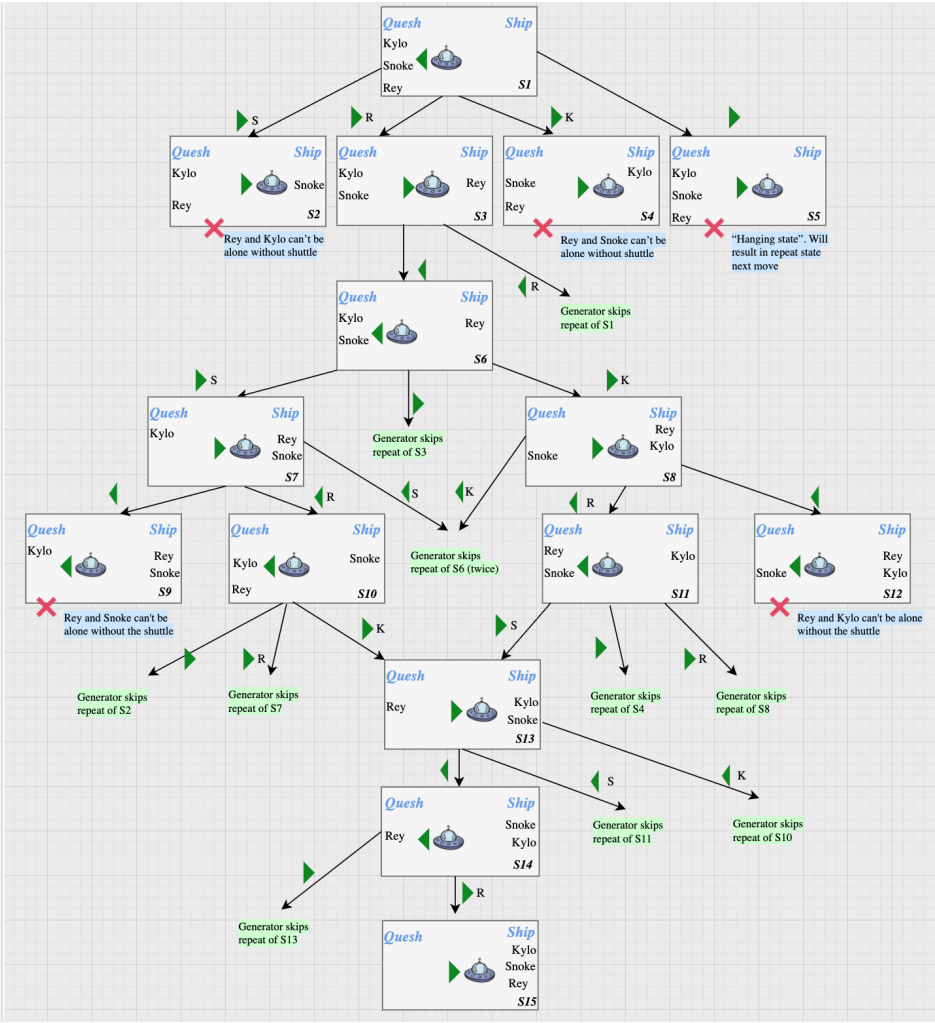

Figure 2—Generate and test functions share responsibility in finding an optimal solution.

2 GDPR RESEARCH AND ANALYSIS

2.1 Overview of the Legislation

The General Data Protection Regulation (GDPR) is a law in the European Union, which puts requirements in place to protect consumer privacy. Among many provisions, this law stipulates that businesses must get consent before processing personal data, allow customers to access their own data and, in some cases, afford customers the ability to request that their data be deleted (De Groot, 2020).

2.2 GDPR, AI, and Personalization

Given that the processing of personal data is a prerequisite for building personalized experiences, the GDPR has the potential to affect businesses that use personalization. According to article 6 of the GDPR, businesses can only process personal data if a customer consents upfront to that processing, or if that processing is deemed essential for one of several reasons, including the "performance of a contract to which the data subject is party" and "compliance with a legal obligation" (Commission Regulation 2016/679).

The European Data Protection Board (2019, p. 15) further clarifies that "personalisation of content may (but does not always) constitute an intrinsic and expected element of certain online services, and therefore may be regarded as necessary for the performance of the contract."

Taken together, this means that companies who want to use AI for personalization likely have two choices: either get consent directly from customers or have a business model that in and of itself is so obviously reliant on personalization that it is fundamentally a part of the contract with its customers.

2.3 Personalization Examples

TikTok is an application that allows users to post and watch short-form videos. A core element of this service is its personalization engine, which shows users videos based on their personal data (history of videos watched and interacted with in the past). While personalization is strongly embedded in this experience, people could still use the service without this element. For example, users could watch short-form videos without them being personalized to their tastes.

Duolingo, an application which helps users learn foreign languages, is a good example of a service that needs personalization to function. In order to teach someone else a language, or any type of skill, a teacher needs to have some understanding of what his or her students know. For example, you wouldn't want to teach someone advanced calculus if they don't know how to count. Similarly, in order for Duolingo to teach someone a new language it needs to retain knowledge of what a given user "knows" and personalize the tasks and questions it gives its users based on that information.

2.4 Applying the GDPR to Personalization Examples in the EEA

As cited in 2.2, article 6 of the GDPR would be relevant to these examples, because it stipulates that in order to engage in personalization, companies must either obtain customer consent or have a legal or contractual reason to process the data (Commission Regulation 2016/679).

Duolingo would likely be able to argue that because personalization is part of the contract with its customers, it should be lawful to process customer data. TikTok, on the other hand, would likely need to get users to agree to data processing explicitly in order to comply with the GDPR because its personalization is unlikely to be deemed a part of its contract with customers.

It's also worth noting that these examples apply not only to the EU, but to the broader European Economic Area (EEA), which is a trading market comprising the European Union as well as three additional states – Norway, Iceland, and Liechtenstein. The EEA was established to enable free trade between its member countries. In the summer of 2018, the GDPR was expanded to cover not only the European Union but the broader EEA (Berry, 2018).

Article 3 of the GDPR states that the law is applicable "... regardless of whether the processing takes place in the Union or not" (Commission Regulation 2016/679). This means that even if TikTok and Duolingo process data outside of the region they still must adhere to the rules if the users are in the EEA. This creates an interesting scenario where international companies may need to choose either to enact a new set of policies and practices that are specifically tailored to users in the EEA or to simply adopt stricter GDPR laws universally.

2.5 Service Adaptations and Rights Analysis

Given the analysis in 2.3, it stands to reason that in order to comply with the GDPR, TikTok would need to ask users to agree to personalization before they process personal data. This could be accomplished by making every new user agree or disagree with this stipulation before using the application. If a consumer does not agree, TikTok could simply surface the most popular videos, rather than the most personalized ones. Duolingo, on the other hand, likely would not need to make changes in order to comply with the GDPR because its service is not possible without personalization.

Ultimately, if companies act in good faith, it should be possible for users in the European Economic Area to use both of these tools without giving up their rights. For example, if TikTok provides the alternative to their service discussed above (showing non-personalized videos) and gives clear information about how they are using the data when asking for consent, there is no reason for customers to have their rights violated.

In reality, however, the regulations in the GDPR might be too vague when it comes to personalization. For example, Finck (2020) argues that the concept of consent raises certain issues, namely that customers may not comprehend what they are consenting to (p. 2) and that without offering an alternative, it may not actually be possible to give legitimate consent (p. 4). These arguments apply well to TikTok, which might be able to get away with following the GDPR in theory, but could be tricking customers in practice by making it easy for them to consent without really knowing what they are consenting to, or by failing to provide an adequate alternative to personalization. Ultimately, it should be possible for users to use these services and maintain their rights as defined by the GDPR, but the definitions of those rights might need to be further refined to truly achieve the underlying goals of the law.

3 REFERENCES

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