KBAI - Homework 1

Badri Narayanan CG
cgbadri@gatech.edu

***Abstract*—This document answers the tasks to be completed as part of KBAI homework 1 Spring 2022. Task 1 shows semantic network representation and the entire semantic network showing the transition from init state to goal state. Task 2 explores General Data Protection Regulation.**

1 QUESTION 1

Figure 1 shows the semantic net representation. Nodes with the letters R, S and K represent Rey, Snoke and Kylo Ren respectively and are colour coded for representing their movements between planet Quesh and the orbiting ship using coloured and direction-specific arrows. A white arrow represents the shuttle moving on autopilot. The oval represents planet Quesh and the rectangle represents the orbiting ship. There are state validity markers to show if a state is valid/why they are invalid. Remember that Rey and Snoke or Rey and Kylo Ren cannot be together without the shuttle.

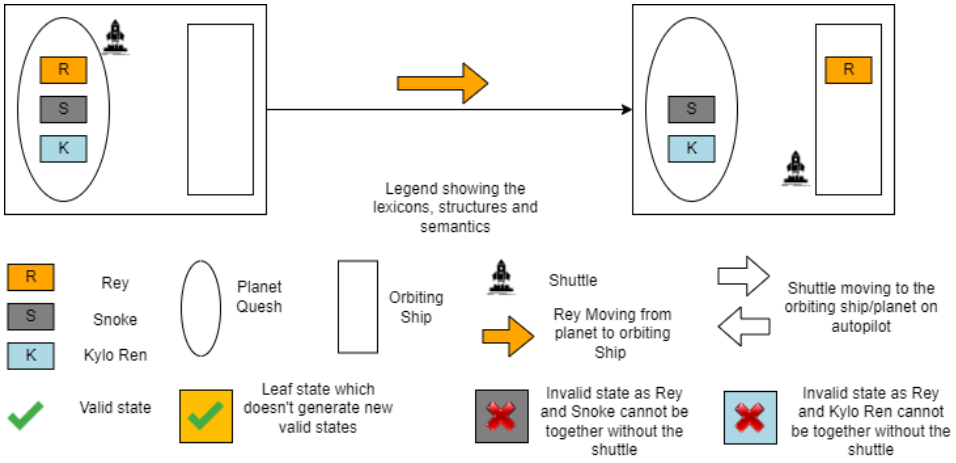

***Figure 1*—Semantic net representation for task 1**

1.1 Solution 1

Figure 2 shows the entire semantic network to answer question 1. The generator takes up responsibility of not generating duplicate states which have previously been visited.

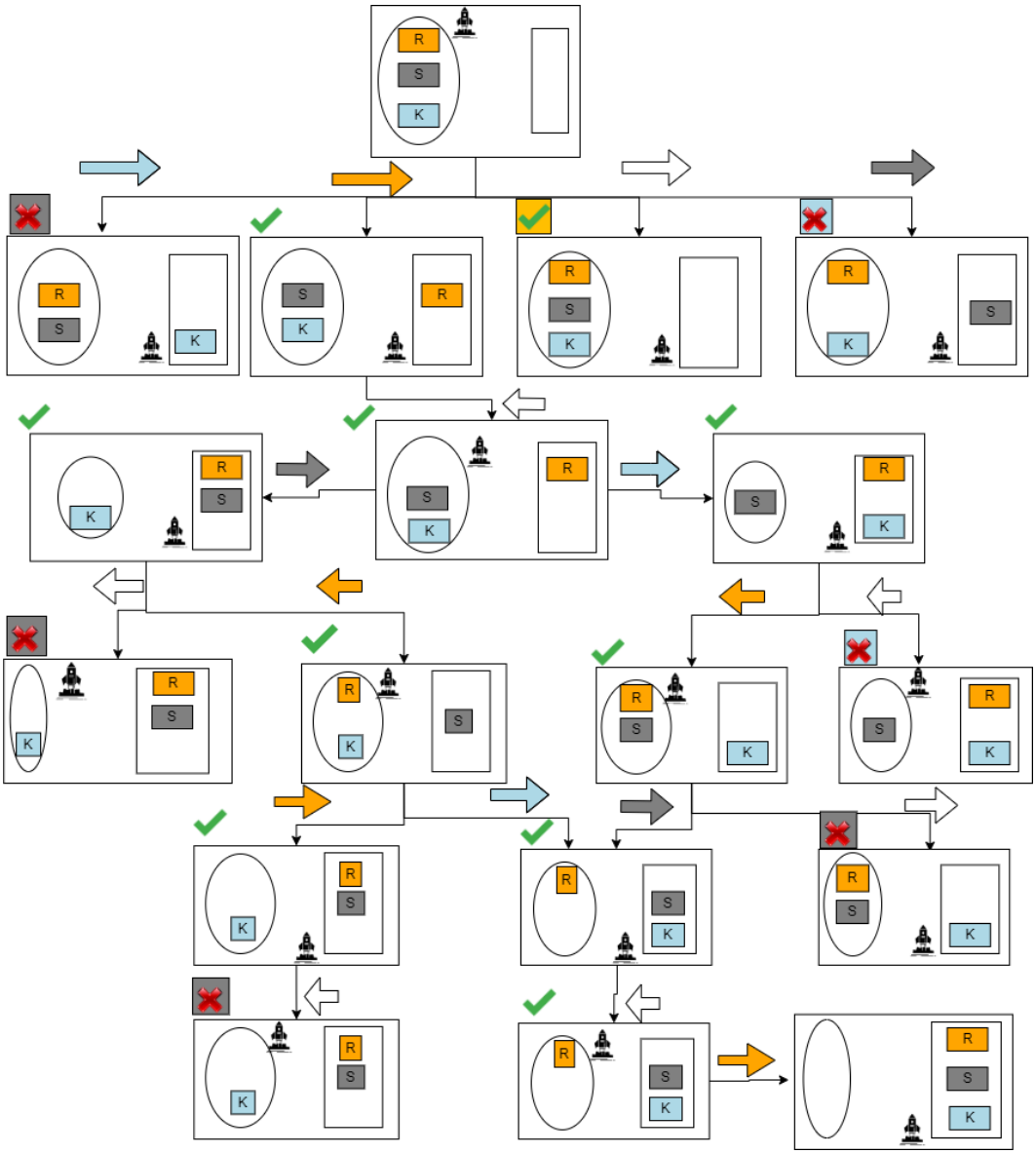

Figure 2—Semantic network to solve task 1

2 QUESTION 2

2.1 What is GDPR?

General Data Protection Regulation (GDPR) which came into effect on May 25, 2018 is a set of privacy and security standards imposed by the European Union (EU) which regulate the processing and movement of personal data of any person who resides in the EU. Any organization processing personal data

of EU citizens or residents has to comply with stringent controls imposed by this policy whether or not they operate on that data within the EU jurisdiction. Failing to adhere to the standards makes them liable to pay hefty fines to the EU and also gives the subjects of the data collected "the right to seek compensation for damages"(gdpr.2019.1, 2019).

2.2 Personal data and GDPR:

Let us first establish what is personal data from a GDPR context and introduce the common terms used by GDPR.

Formally, GDPR defines personal data as "any information relating to an identified or identifiable natural person ('data subject')"(gdpr.eu.2018, 2018). For example: name, identification number, locations or online identifiers etc. This broad scope of what could constitute *"personal data"* is aimed at giving individuals greater control over how organizations process or control the processing of their data.

More informally, " basically any subjective or objective information that could be used, or used in combination with publicly available information, to identify a living human being counts as personal data."(gdpr.2019.2, 2019)

GDPR defines a set of 6 principles relating to processing of personal data here and 6 legal bases here. Organizations must identify at least one of these 6 bases a valid premise for the personal data processing they do.

GDPR also defines roles for the people or organizations. The ones explicitly applicable to this paper are Data Controller, Data Processor and Data subject. (gdpr.eu.2018, 2018)

2.3 Using personal data for personalization of user-experience online:

The GDPR aims to build an end-user centric consent-based model to regulate the usage of personal data for customizing user-experience online. More importantly there is an emphasis on end-user consent and empowering the data-subjects with specific rights (as mentioned in articles 15 to 21. This one stands out)

There are specific sections of GDPR which discuss online usage of personal data. Online identifiers such as IP addresses, cookies, RF-ID tags etc collected from user devices along with unique identifiers may be used to identify a person or create a profile. (gdpr.2020, 2020).

Another important aspect of customizing user experiences online addressed by GDPR is the use of **cookies**. The regulation gives a brief introduction to cookies, their types and purposes before proceeding to explain how under certain circumstances, the information stored in cookies can be considered as personal data. The legal bases that need to be covered before companies or websites can use cookies to process personal data are established as follows: "Companies do have a right to process their users' data as long as they receive consent or if they have a legitimate interest." (gdpr.2019.3, 2019). There is also discussion on ePrivacy Directive (EPD) which is a law that supplements GDPR and even overrides it in some cases. The EU trying to bring in the ePrivacy Regulation (EPR) as a replacement for EPD.

2.4 How GDPR might affect AI based personalization:

The success stories of targeted ad-campaigns and organizations providing highly personalized services such as Amazon and Google are enough information to suggest personalization is a key component in online marketing. However about 92 percent of EU citizens are expressing concerns about their online privacy. (gdpr.2019.4, 2019)

This is where organizations can leverage GDPR compliance as a tool that promotes transparency and accountability. Being GDPR compliant improves customer trust as they have more control, enhances an organization's reputation and helps build better customer relationships. The greater information governance and cyber resilience that comes as part of the compliance is an additional bonus.

For personalization, the most important component needed by AI agents/algorithms is data. With restrictions on how the data can be processed, there is additional responsibility on the data controllers (the organizations) to involve data processors (third-party data collectors for example) who ensure that all the necessary GDPR standards are met when collecting and correlating the data to be presented to the AI agents.

Running a GDPR compliance check on all the data needed by the agent is just 1 additional step before invoking the agent. If the user does not consent to sharing personal data, then alternative "less personal" levels of customization can be provided depending on the amount of data available. Common placeholders can be inserted to "plug" the holes left by the missing data which might reduce the

degree of changes needed in the actual agent.

2.5 Netflix as an example of personalization:

Netflix can be a perfect example of a system that has personalization deeply rooted in its design. Their research site states this out explicitly. "Personalization is one of the pillars of Netflix because it allows each member to have a different view of our content that adapts to their interests and can help expand their interests over time." (Netflix, n.d.) Personalization is key for Netflix because it helps them build an effective recommender system which improves user experience and also, in planning how they utilize their network for load-sharing. For example, placing the most relevant content at a server closer to consumers who are more likely to view it. But as such, their system or business model will not entirely collapse if they are not able to provide personalized service. They will still be able to show the content a user searches for or have one global view accessible to the end-users.

2.6 Vital health monitoring device as an example of personalization:

A personalized vital health parameter monitoring system such as the one developed in (Marimuthu, Perumal, and Vijayakumar, 2020) involves continuous processing of vital health parameter data from a patient's wearable sensors by an intelligent algorithm. The system is used for detecting abnormalities and triggering alert to the care-taker/medical professional. This system needs a high degree of personalization as normal range of values for these health parameters vary from person to person based on age, gender, risk factors, environment etc. So naturally, the system involves collection and processing of personal data at different levels to provide the right results for each patient. Without personalization, such a system cannot fulfil its basic functionality and will be ineffective.

2.7 European Economic Area (EEA):

The European Economic Area (EEA), is an agreement made in 1992 that brought the members of the EU along with Iceland, Liechtenstein and Norway into a single market (Kenton, 2022). It seeks to strengthen socio-economic relationship between the parties involved.

The official GDPR website claims that this regulation extends to the any individual who is a resident of the EU (or EEA) (gdpr.2019.2, 2019). The article-3 of the GDPR (gdpr.2018, 2018) attempts to clarify any questions which might

occur with regards to transfer of data outside of the EU. Its clear that no matter where data is processed or where it originated, if it belongs to an individual who is a resident of EU, then the organization needs to be GDPR compliant in dealing with the data. Apart from these, there is more information present in article 44 and a particular citation which states that "In any event, transfers to third countries and international organisations may only be carried out in full compliance with this Regulation." (gdpr.2020.2, 2020). Pseudonymization is another technique by which some of the personal data fields which can be used to identify people are replaced with artificial identifiers or random values.

2.8 The example of vital health monitoring is relevant to the following sections:

(gdpr.2018.2, 2018) - Article 5, the collection and processing of health data needs to satisfy the 6 principles related to processing of personal data. The data should be collected for the specific purpose of medical analysis, adequate and necessary data should be maintained accurately in a secure data store and shared over encrypted channels. (gdpr.2020.3, 2020) - Article 6, the system satisfies most of the 6 legal bases needed for processing the data. It only needed to satisfy one. Data is collected with the patient's consent, it is necessary for delivering the service to the patient and fulfil the vital interests of the data subject to get immediate help in case of an emergency. gdpr.2018.3, 2018 - Article 9, the system processes sensitive health data of the patient and is not prohibited since the data subject (patient) has consented and processing the info is necessary for providing health care or medical diagnosis.

The above reasons justify the argument that the vital health monitoring system in its current state is already GDPR compliant. As additional steps the below can be tried.

1. Consent forms clearly explaining the data being collected and the purpose of use can be created to obtain explicit user consent.
2. The data upload channels and storage must use end-to-end encryption to protect the data.
3. The data shouldn't be used for any other purpose other than the originally intended purpose.

The users can confidently use the system with these minor enhancements by any resident of the EU (or EEA) without giving up their GDPR rights.

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