CS 7637: Homework 1

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1 SEMANTIC NETWORKS

1.1 Semantic Network Construction

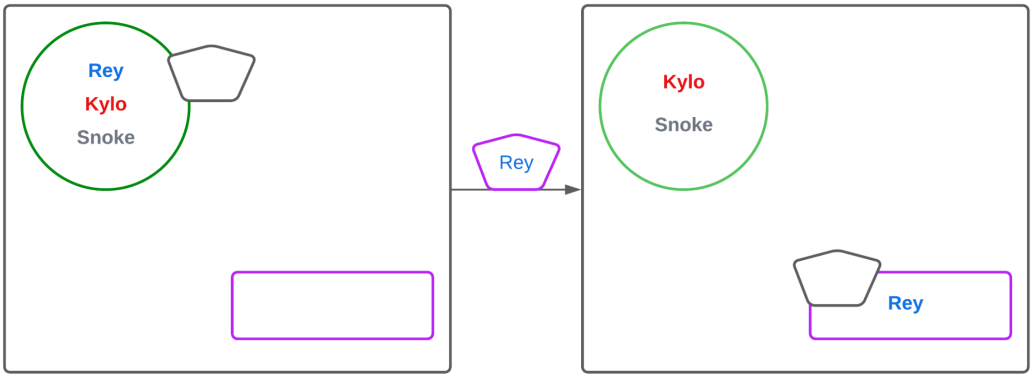


Figure 1—Semantic Network representation of the problem. Color-coded to help with more clarity when expanding the state space

In this question, the prompt gives a slightly modified version of the wolves and sheep problem except this time with Star Wars characters involved instead of Sheeps and Wolves. Just as in the original, the question requires us to move all of the characters from the starting point, the planet, onto the cargo ship. However, there are quite a few more rules to consider than what we originally had. First, the transfer ship can take 0-1 people at a time, and for other reasons, Rey cannot be alone with Kylo or Snoke without the ship present.

To make it a bit easier to read and interpret at a distance, the figure ends up using color-coding. Each of the characters are color coded accordingly, with Rey being blue, Kylo being red, and Snoke being light-gray. The planet is green, the cargo ship is purple, and the transfer ship is shown to be gray in the diagram. The transition between one state to another will be represented by a gray arrow with the transfer ship, color-coded to show the destination of the ship, and the name of its passenger inside. If the transfer ship is carrying no passengers, then there will be no name inside of the pentagon.

1.2 Generate and Test

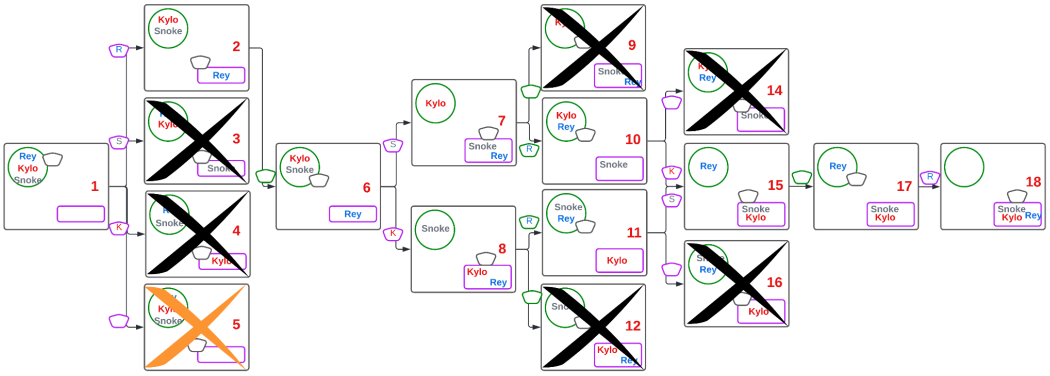


Figure 2—Full semantic network of the problem, from start to finish. Color-coded for visibility sake. Full version in the appendix if this version is not clear enough.

After applying the generate & test method to the original semantic network, this is the result that came up. For simplicity's sake, the generator is in charge of identifying states that have already been visited, which means that the generator will not generate the move if it leads back to a state that has already been visited before.

Not including the states that have already been auto-eliminated by the generator, there ends up being 7 states that fail: States 3, 4, 9, 12, 14, and 16 are failing because of the rules, and state 5 fails because there are no other moves that the generator can generate from the current state.

As stated in the previous part, there are two major rules that will make the state fail, Kylo and Rey cannot be alone without the shuttle, and Rey and Snoke cannot be alone without the shuttle. In states 3, 12, and 14, Kylo and Rey are left alone without the shuttle, causing the state to fail. In states 4, 9, and 16, Snoke and Rey are left alone without the shuttle, which would then cause the state to fail. In the figure, I marked these validity-breaking states with a black X marker.

However, state 5 is in a different state, as it technically isn't breaking any rules yet. However, since the only valid move that state 5 can perform is moving the shuttle back to the planet, this ends up going back to a state that we have already been in before. Since we want to avoid previous states, I marked it with an

orange X marker to signify that while it does not break any rules, the state is invalid due to it arriving at a dead end.

In the end, the generator arrives at state 18, which is the final state that the agent is searching for. After this, the generator stops generating new states, since the goal has been reached already.

2 GENERAL DATA PROTECTION REGULATION (GDPR)

Passed in 2016, the General Data Protection Regulation, or GDPR, was a regulation in EU law that concerned data protection and privacy for European citizens. Although it seemed to only affect Europeans citizens at first, the law itself actually affected many services around the world, as they had to follow these rules if their product were used by European citizens, else face a fine.

2.1 Regulation and Personalization

From what I managed to read and understand through the GDPR text, it seems that the GDPR is ok with companies using personal data to personalize individual user experiences online. However, while there is no rule stating that this isn't allowed, there are a lot of rules attached with the data collected.

Article 5 covers many of the rules that companies, or controllers, must abide by when collecting and processing personal data. Data needs to be handled lawfully, fairly and in a transparent manner, should be collected for a specific purpose, only collect what is necessary, and also should be kept accurate. Data should also be kept too long, and can only be stored for longer periods of time for other specific uses. Data also needs to be made and stored such that it has confidentiality and integrity.

With the GDPR, users have a lot of control over the data that they give to the company. Articles 12 to 22 detail the list of powers that the user have over their data, such as the right to erase their data, restrict their data from being processed and used in personalization, as well as the right to decide who accesses their data.

On the company side, Article 30 covers a large list of things that each company, or controller, must record down before processing and using the personal data. Some of the things include reason for data processing, time limits, and also which part of the personal data that was going to be used for the processing. In

all, personal data can still be used for personalizing individual experiences online, but there are now a lot more restrictions and permissions that need to be obtained before the data can be used properly.

Overall, these regulations end up hurting programmers when they want to use AI to create these personalized experiences. If users do not allow their data to be used on the website, then the AI agent is useless, since it has no information to use. The right of erasure also makes it harder for AI to help create personalized experiences. From previous classes, I learned that many AI models are built off of a lot of previous data, sometimes trained and tested many times over until a desirable result is obtained. If a user that was part of this training set decided to remove their data, this may result in our model needing to be retested and retrained, since the model being used still is using the person's data that was requesting to be deleted.

2.2 Personalization in the Industry

Most major websites use some form of personalization in their business model. As stated in the prompt, Amazon takes note of recent orders and viewed items, eventually using that information to curate personalized recommendations. LinkedIn and other job boards do the same, taking information from previous searches or your uploaded resume, and recommending you jobs related to that.

For my example where personalization is deeply embedded in its model, but not to a point where there is no service without personalization, would be YouTube. Similar to Amazon, YouTube will display videos based on your viewing history, either the videos themselves or videos in the same vein of it. However, if you were to remove all this personalization, using YouTube as a simple video search engine is still possible, albeit slightly harder if the information you are searching for is more niche.

While Amazon and YouTube can still function well without personalization, I wanted to point to another example that suffers heavily without personalization, which would be TikTok. While I am not deeply knowledgeable about the inner workings of the application, I do know that TikTok relies on what people know as the "algorithm" to continually find and show short videos to users. However, without personal data such as videos viewed, users followed, and etc, I feel that the algorithm would be broken: Instead of giving similar short videos to entice the viewer to keep on watching, the lack of personalization would lead to the

user being sent to random videos unrelated to the previous ones watched, lowering the user's watch time and possible even stopping them from using the app. Their original service, which was to keep users entertained through user-created videos, would be greatly affected if there was no personalization.

2.3 EEA and the GDPR

By the base definition, the EEA, or European Economic Area, is the name for a group of countries near and inside of the European Union. Specifically, its members include everyone inside of the European Union, such as Denmark, Finland, France, etc., and some nations outside of it, such as Iceland, Liechtenstein, and Norway. Since the GDPR is active throughout the entirety of the EEA, any information that is collected by agencies inside of the EEA or information obtained from inside of the EEA would be subject to the rules that the GDPR states.

In the GDPR, I think that sections 13 and 17 are the most relevant to the examples I chose with YouTube and TikTok. Article 13 states that when personal data is collected from a subject, then the company/controller should provide the subject with information, such as identity of the company, purpose of the information processing, who gets the data, etc. From what I know, YouTube and TikTok do not give any notification about data collection, but that may be due to the fact that these permissions were asked for during account creation. However, in order to abide by the FDPR, if the user is in the EEA or from the EEA, the companies should have some sort of a notification that tells them that the videos they watch will be used to help curate their experience. Instead, there is no notification or information given, and the user would simply assume that the related videos or shorts do not have anything to do with their personal data.

On the other hand, Article/Section 17 talks about the right to erasure. While I haven't used TikTok personally, I know that YouTube does have this feature available, such as being able to erase your viewing history. YouTube also has a even more in-depth feature for this, allowing users to see what parts of the user data is being used by YouTube, such as search history, web searched, etc, and having the ability to remove and prevent YouTube from using these, which leads into Article/Section 18, the right to restriction of processing. In terms of deleting an entire account, TikTok lets a user deactivate an account for 30 days, and if the user has not reactivated the account by then, delete it forever. Overall, these

functions seem to be available to all users, even outside of the EEA, which does show the influence and power that the GDPR has over personal data.

2.4 Adaptation

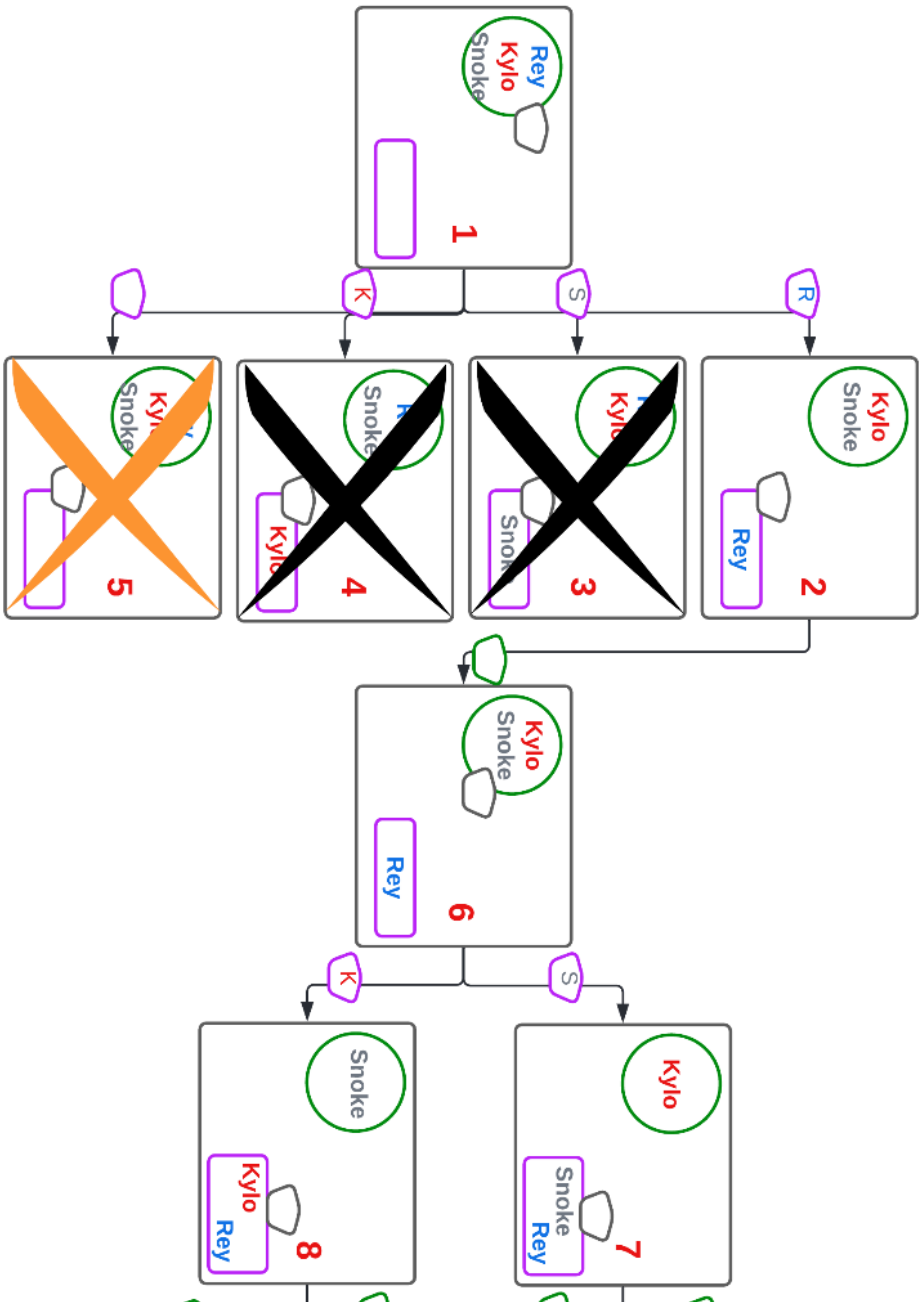
Overall, the two services I talked about, TikTok and YouTube, are pretty well adapted to these GDPR restrictions. TikTok, along with account deletion, has the option to send the user their own personal data, such as comments, likes, and videos. However, I feel like there could still be some more work to be done.

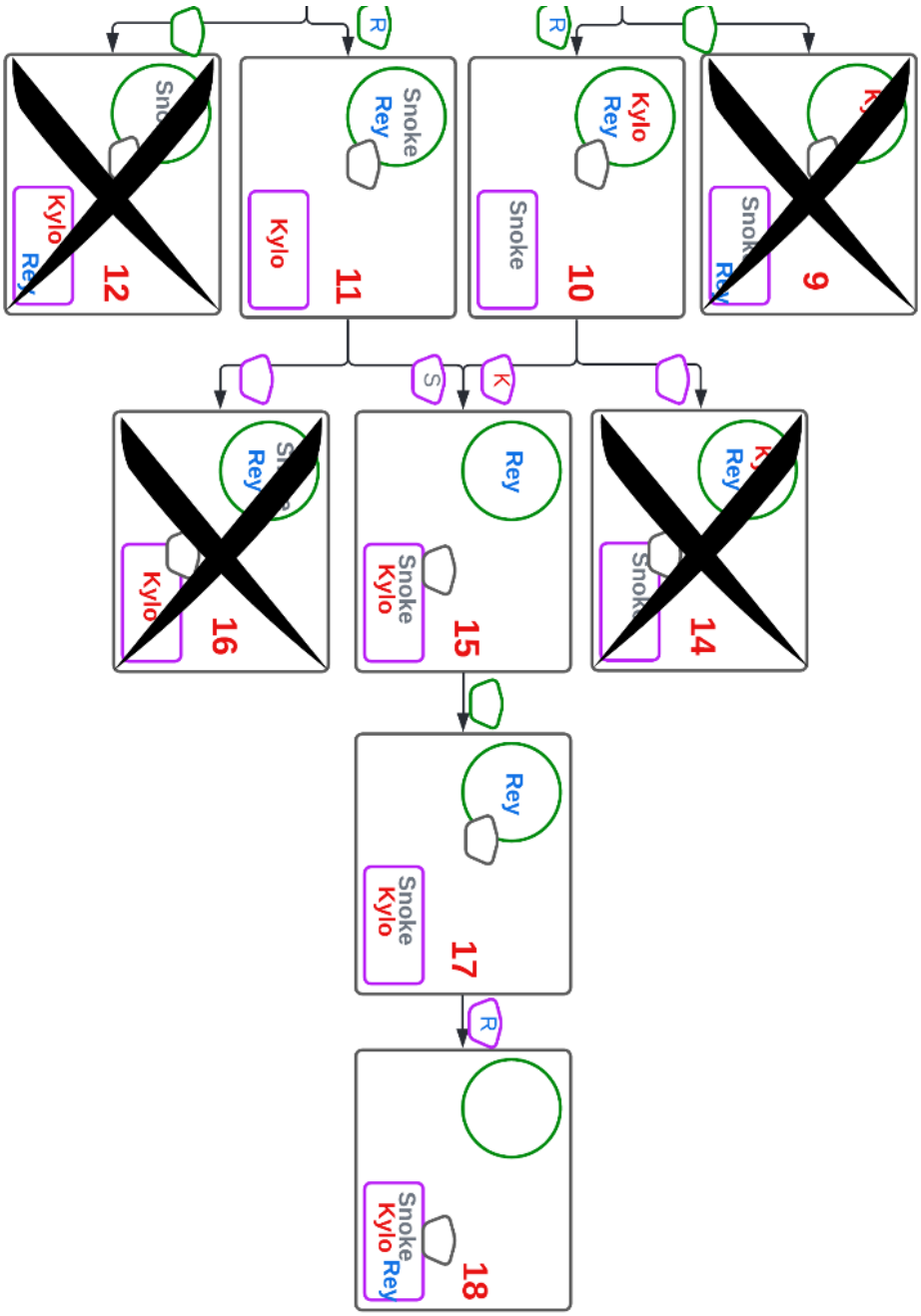
For example, before viewing a video for the first time in a day, there could be a notification that pops up, saying that all videos and shorts currently viewed will be used as data to help personalize your experience. If the user wants to opt out, then the notification can lead them to the setting page to turn it off, but otherwise leave it on. If the user requests it, YouTube should send user data, such as videos viewed, etc. to the user and clearly label how it has been used, such as for video recommendations, etc. A lot of websites in the post GDPR period always lead with a notification about cookies, and how by accepting cookies you agree to your personal data being stored and used. By doing this with the examples I stated before, it should help adapt these services for the restrictions.

Users in the EEA should still be able to use these tools without waiving their GDPR rights. As it stands, both of these applications are in service in the EEA, as YouTube is still one of the premier video and streaming platforms, and TikTok continues to expand and grow its popularity among teenagers and young adults. While I feel like some of the rules aren't fully followed, such as right to restriction and transparency in TikTok, a few fixes should make the application GDPR compliant without changing its service. Similarly, YouTube already does adapt well to these restrictions, allowing users to see what data is collected as well as what type of data is used for their services. At last with the examples that I selected, I find it quite reasonable that users in the EEA are able to use these tools without waiving their GDPR rights.

3 APPENDICES

Figure 2 Enlarged:

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