

Q1: Tibbs is a cat.

Q2: Fido might be a dog.

Q3: Yes.

Q4: Can't be decided.

Q5: As I see it, knowledge representation is designed to help the machines better identify and understand the knowledge. When knowledge is input from human to machines, without knowledge representation, machines can't understand and handle it at all. So here comes what knowledge representation does, it translates the knowledge from natural language to the way that machines can understand. As a surrogate, it forms a bridge between human knowledge and machine knowledge, thus making machines have the ability to acquire, process, understand and further more apply our knowledge. Additionally, knowledge representation also works for human, it allows us to preserve knowledge in a much more concise and efficient way, which natural language can never make it.

Q6: As I see it, the application should divide sushi into three

categories: rolls, temaki hand-rolls and nigiri according to the menu. Each kind of sushi with its ingredients is classified into the above three categories. Additionally, all kinds of ingredients will be classified according to their types, just like what we does in Q7. Once these things were finished, the process of ordering and making sushi will be very simple: after placing the order, the application gives us which kind of sushi we should make and its ingredients to us, and then the application matches the ingredients with the varieties so that we can find the correct ingredients more efficiently. For instance, if a customer orders avocado maki, the application will tell us that we need to make avocado maki with avocado in fruits (a subclass in ingredients, following statements are in the same way), vegan mayo in condiment, nori in seafood and rice in grain, then we can make the correct sushi easily.

Q8: When developing my sushi ontology, there are four main techniques I've used as follows.

To start with, formalizing, meaning that I would express the menu in a more concise way. The sushi menu is so fancy that it will be difficult to obtain effective information without processing it, so at the beginning of my work, I formalized part of the content on the menu according to my own understanding, which makes extracting valid

information to develop my sushi ontology easier. For example, a long sentence "Salmon, chilli oil & avocado, rolled in crispy onions. Topped with sriracha sauce & mayo. 200 kcal" follows dynamite in rolls, but after formalizing, it becomes "dynamite: salmon, chilli oil, avocado, onions, sriracha sauce, mayo", maybe the expression is still not simple, but I've removed the redundant information, so that every word plays its role in developing my sushi ontology.

After that, I used the enumeration method to represent all valid information, and during this process, I chose sets to store the information listed. As we all know, set elements are mutually different, but sushi ingredients are often the same, for instance, almost any sushi will use rice, and obviously we can't add the word "rice" so many times, where comes the benefits of using sets: duplicate elements will be merged. Thanks to this feature of sets, We can maintain mutual exclusion in subclasses. Take avocado maki and yasai(in rolls) as an example, both of them contain avocado, but the set will allow the word "avocado" to appear only once.

Thirdly, taxonomy was used to manage the listed elements. The ingredients range widely, so just classify them under sushi ingredients is not enough, and this would do no good to our application in Q6. Imagine that a customer orders avocado maki and then the application tells us that we need to make the correct sushi with

avocado, vegan mayo, nori and rice in sushi ingredients, in such case how can we find the exact things in a short period of time? To avoid the happening of this situation, I categorized various elements so that finding some kind of them might be faster. Each kind of ingredients will be put into a type subordinate to the ingredients of sushi, then we can find what we need in a much smaller range. As a case in point, inari and tofu belong to bean products, and finding them in this subclass costs less time than that in sushi ingredients.

Finally, I'd like to discuss the method when building the overall structure. While developing the sushi ontology, I used a bottom-up method, which really brought convenience. The reason why I used such approach is that we need to start from the most basic element, and then to a larger subclass. Step by step, then we get the sushi ontology. For example, beef, chicken and duck make up the subclass "meat", and "meat" makes up sushi ingredients with other things.

Above all are techniques I've used while developing sushi ingredients ontology, thanks for reading.