Actionable Knowledge Representation

Exercise #3

Universität Bremen

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1 Queries for our Ontology

https://triplydb.com/DavidPruser/Rehab-Ontology

Following this link, you will find our uploaded ontology and 11 different Queries that highlight the capabilities of our ontology. Below, we will discuss the different queries and the competency Questions they answer. For reference, we will attach our previously defined competency questions in the last section.

2 Queries

We defined 11 Queries in total. Since our main goal was to link exercises against symptoms and symptoms against diseases, we started off by defining two queries (**ExerciseToSymptom** and **DiseaseToSymptom**) to showcase how the relationships between these work. These queries are also able to answer competency questions (cq) 1. and 2.

To answer cq 3. we wrote a query (**ExerciseToDifficulty**) which shows the difficulty level for each exercise. What we did was to take all exercises and then use the object property *hasDifficulty* to find the corresponding difficulties. From here one could just put a specific exercise instead of all exercises into the query and cq 3 is answered.

Since the first two queries showed how exercise to symptom and disease to symptom work, we can outline our main goal, which is writing queries about certain exercises for certain diseases. We defined a query (**DiseaseToSymptomToExercise**) which takes the disease to symptom and exercise to symptom and connects them on the example of Arthritis leading to us receiving all

exercises that help with Arthritis.

This can further be extended by the query (**DiseaseToSymptomToExerciseFilterAgeGroup**) which in essence does the same, but returns only those exercises that are recommended for elders. Another extension is the query (**DiseaseToSymptomToExerciseToSubclass**) which only returns the types of the exercises that are used to treat Arthritis, not the exercises aswell. This also answers cq 4.

Answering binary questions does not only involve *SELECT*(ing) certain classes using the *WHERE* keyword, but it involves using the *ASK* keyword in *SPARQL*. To answer cq 5. we used the query (**SpecificExerciseToSpecificSymptom**) which asks, whether or not the bent over row exercise relieves shoulder pain. This query returned true, meaning bent over row indeed helps with shoulder pain. The same can be done for cq 6. which we answered with the query **SpecificSymptomToSpecificDisease**.

Counting Questions can be solved similar to Selection Questions but the SELECT needs an extension *(COUNT(...))* which leads to not listing all entries, but only the count of them. CQ 7 is represtend by the query **CountingExerciseToSymptom**, where we counted all exercises that relieve Neck Pain. The result was 16 exercises relieve Neck Pain. The same can be applied for cq 8. and 9. which were mapped by the queries **CountingDiseaseToSymptom** and **CountingExerciseToMuscleGroup**, respectively.

In the end we were able to answer all competency questions and more, as queries like **DiseaseToSymptomToExerciseFilterAgeGroup** show.

3 Competency Questions

3.1 Selection Questions

1 Which exercises help with which symptom?

2 What symptoms have which diseases?

3 What difficulty has the exercise?

4 What type of exercise helps relieving which disease?

3.2 Binary Questions

5 Does the exercise relieve the specific symptom?

6 Does the symptom belong to the disease?

3.3 Counting Questions

7 How many exercises are there that relieve a symptom?

8 How many symptoms does a disease have?

9 How many exercises are there for a certain muscle group?