Exercise Sheet 10: Advanced Cypher

Maximilian Marx, Markus Krötzsch

Knowledge Graphs, 2019-01-08, Winter Term 2018/2019

Exercise 10.1. Which of the following graph patterns are expressible in Cypher? Explain your answer by either giving a Cypher query or by arguing why there is none.

1. Find nodes that are connected by an `:EDGE` path of length ≥ 100
2. Find nodes that are connected by an `:EDGE` path of length ≤ 100
3. Find nodes that are connected by an `:EDGE` path of length $\neq 100$
4. Find nodes that are not connected by an `:EDGE` path of length 100
5. In a graph with a `:PARENT` property, find nodes with a common ancestor
6. In a graph with a `:PARENT` property, find nodes that are cousins (of any degree)
7. Find nodes that are connected by `:PROP_A` but not by `:PROP_B`
8. Find nodes that are connected by a `:PROP_A` path, but not by a `:PROP_B` path
9. Find nodes that are connected by a path of nodes as in 7.
10. Find nodes connected by an arbitrary path
11. Find nodes connected by an arbitrary path of even length
12. Check if the graph contains an even number of nodes

Exercise 10.2. Neo4j provides numerous extension over the openCypher language, including the list predicate functions `all`[1] and `any`[2], that check whether a condition is true for all elements (or any element, respectively) of a list.

Show that these two functions are sufficient to encode **TrueQBF** in a Cypher query. What can you say about the complexity of answering Cypher queries?

Exercise 10.3. Download and install Neo4j[3], or use the Neo4j Sandbox[4].

Use the `:play movies` command to load the movie example data set. Write Cypher queries that find

1. persons that have acted in or directed movies they wrote,
2. the top 5 movies by the number of actors, and
3. the top 5 actors that have co-starred most often with Keanu Reeves.

[1] https://neo4j.com/docs/cypher-manual/current/functions/predicate/#functions-all
[2] https://neo4j.com/docs/cypher-manual/current/functions/predicate/#functions-any
[3] https://neo4j.com/download/
[4] https://neo4j.com/sandbox-v2/