Norwegian University
of Life Sciences
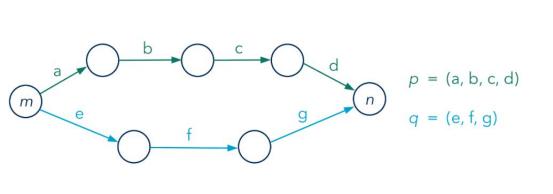
Paths in labelled graphs
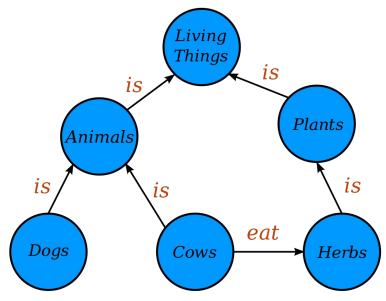
By Jorid Holmen, Christine Isaksen and Christianie Torres
05.12.22

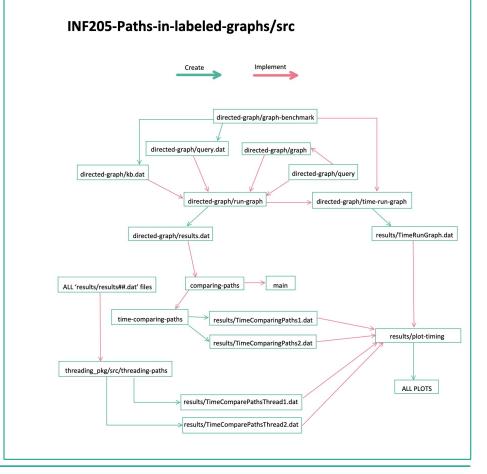Is there a path *p* and a path *q* that contains the same start node and end node?

$p = (a, b, c, d)$

$q = (e, f, g)$

Data structure

- graph-benchmark.cpp
- run-graph.cpp
  - graph.cpp
  - query.cpp
- comparing-paths.cpp
  - main.cpp
- time-comparing-paths.cpp
- time-run-graph.cpp
- plot_timing_inf205.py
- threading-paths.cpp
- plot_time_threading.py

INF205-Paths-in-labeled-graphs/src

Create → Implement →

In-depth explanation of the code

- Already existing code
    - graph-benchmark.cpp
    - query.cpp
    - graph.cpp
    - run-graph.cpp
- comparing-paths.cpp
- time-comparing-paths.cpp
- time-run-graph.cpp
- threading-paths.cpp
- plot_timing_inf205.py
- plot_time_threading.py
- Header files

Concurrency

Threading

- Running 1 CPU for each thread
- Parallelization

ROS

- Messages
- Publisher

Implementation of concurrency in our code

- threading-paths

Concurrency with ros

```
christianie@christianie-VivoBook-ASUSLaptop-X430FA-S430FA:~/catkin_ws/src/INF205-Paths-in-labelled-graphs/src/threading_pkg/src$ ./t
hreading-paths
none equal paths occurs
none equal paths occurs
none equal paths occurs
none equal paths occurs
none equal paths occurs
none equal paths occurs
none equal paths occurs
```

```
christianie@christianie-VivoBook-ASUSLaptop-X430FA-S430FA:~/catkin_ws$ rostopic echo /results
 data: "none equal parts occurs"
 ---
 data: "none equal parts occurs"
 ---
 data: "none equal parts occurs"
 ---
 data: "none equal parts occurs"
 ---
 data: "none equal parts occurs"
 ---
 data: "none equal parts occurs"
 ---
 data: "none equal parts occurs"
 ---
 data: "none equal parts occurs"
 ---
```
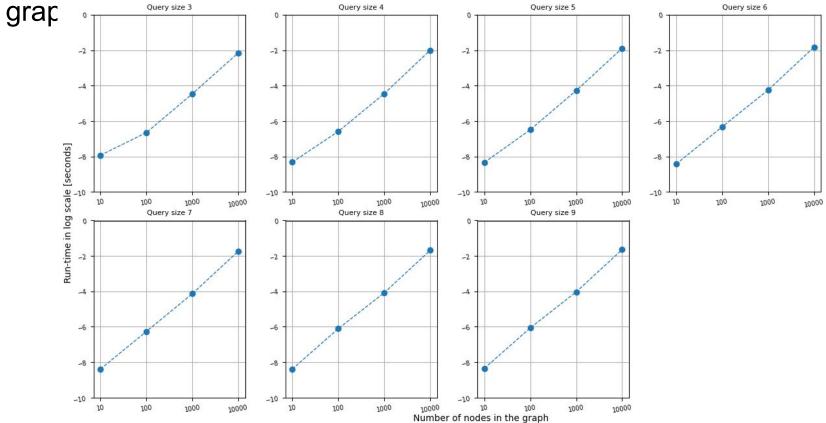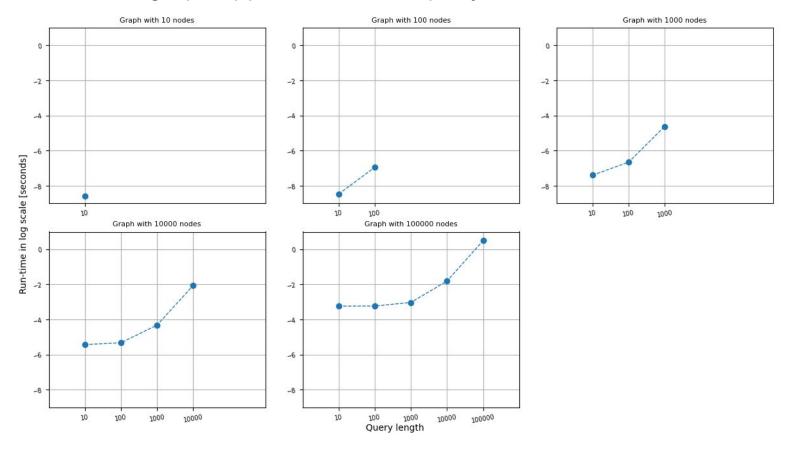
Performance

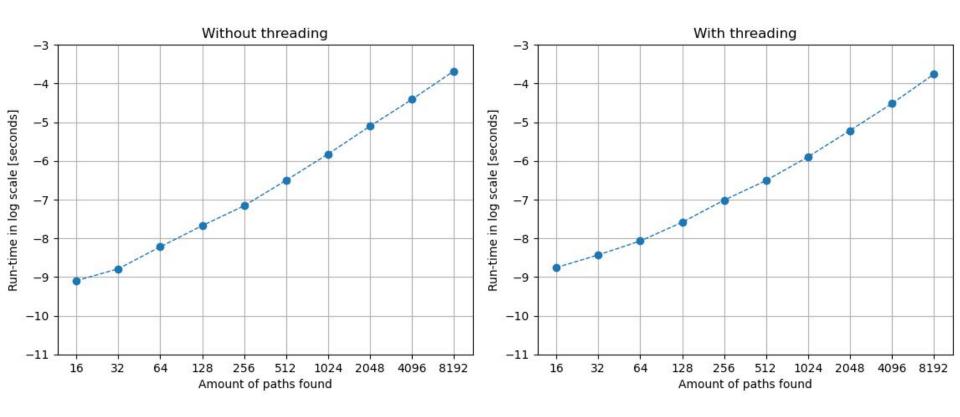- time-run-graph.cpp
- time-comparing-paths.cpp

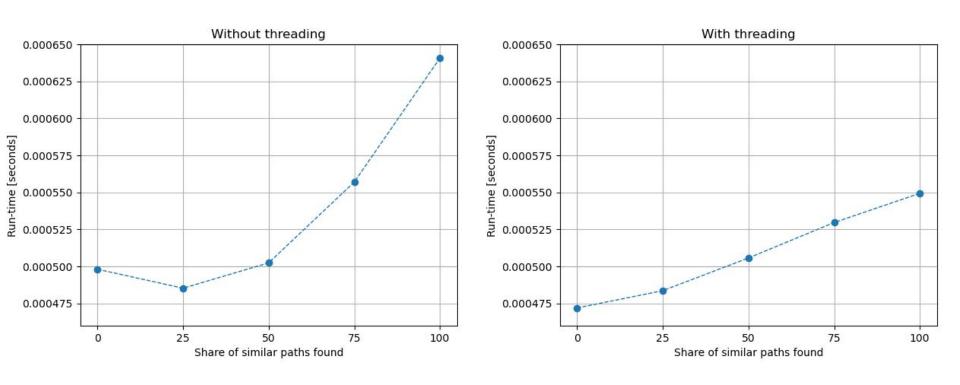# Run time for run-graph.cpp with different amount of nodes in the graph

Run time for run-graph.cpp with different query size

Run time for comparing the paths with different amounts of paths found

Run time for comparing the paths with different amounts of equal paths found

Memory leak

- No memory leak in the initial code
- There might be some in the threading

Documentation

- README.md
- Doxygen
- Comment blocks in code
- GitHub

    https://github.com/joridho/INF205-Paths-in-labelled-graphs.git

    NB! the amounts of commits does not represent the amount of work

Future improvements

- Track down the first queries, and assign p and q to either one of the paths
- An easier way to implement the threading
- Most likely memory leak

Thank you for your attention!