

CS312: Analysis of Algorithms – Degrees of separation

For this assignment, you will read a couple of articles about graphs, degrees of separation, and the Kevin Bacon game. Read the sources provided thoroughly so that you can answer the questions. Answers to the questions are on the text of the provided links. You do not need to Google the questions or read additional material.

Questions from <https://blogs.ams.org/mathgradblog/2013/11/22/degrees-kevin-bacon/>

- 1) What is the object of the Kevin Bacon Game?
- 2) How many actors were listed on the Internet Movie Database (April 28, 2013)?
- 3) What percentage of those actors have a Bacon number of 7 or higher?
- 4) What does an average Bacon number is 2.994 mean?
- 5) What traditional graph theory problem does the Kevin Bacon Game correspond to?
- 6) Why is Breadth First Search a better fit for this problem than the Dijkstra's algorithm?
- 7) For what situations is the Dijkstra's algorithm best suited?
- 8) Give a real world example where the Dijkstra's algorithm would be a good fit.
- 9) What do the rankings at the list of 1000 best centers of the Hollywood universe represent (http://oracleofbacon.org/center_list.php)?
- 10) Go to: <http://oracleofbacon.org/movielinks.php> and explore the app. Query paths between actors.

- a. Query the path between a pair of actors and submit screenshots of two different results for the same pair quer (notice there is a "Find a different link" button at the right top). Here is an example (DO NOT SUBMIT THIS EXAMPLE):



Questions from <https://research.fb.com/three-and-a-half-degrees-of-separation/>

- 1) What are degrees of separation in a graph?
- 2) How many users does Facebook have (as per the writing of the article)?
- 3) What is the average degree of separation for people in the US?
- 4) Assume that each person on Facebook has 50 friends (a conservative low estimate). Assume also that friends do not overlap.
 - a. What is the number of friends-of-friends of a person?
 - b. What is the number of friends-of-friends-of-friends of a person?
- 5) Why is Breadth First Search NOT used to calculate paths and degrees of separation in the Facebook graph? What do they use instead? How does that affect the results? (are the results exact?)
- 6) What couple of software tools do they use in their calculations and what is each one used for?
- 7) What does the title "Calculating degrees-of-separation at scale" mean?