

Movie-Chain-Runner Problem: Final Report

Shashank Singh Jimmy Zong

June 27, 2013

Outline

- 1 Team Members
- 2 Problem Introduction
- 3 Approach
 - Algorithms
- 4 Evaluation
- 5 Benefits
- 6 Summary

Team Members

- Sung Uk Ryu
- Eugene Scanlon
- Shashank Singh
- Jimmy Zong

The Problem

The Problem

Find the “longest” list of overlapping titles in a list of movie titles.

For Example: In the list

- Day of the Dead
- Live and Let Die
- Dead Poets' Society
- Die Another Day
- The Last Samurai

the “longest” chain is

“Live and Let Die Another Day of the Dead Poets' Society.”

The Problem

- Equivalent to finding a Longest Path in a directed graph

The Problem

- Equivalent to finding a Longest Path in a directed graph
- The Longest Path Problem is NP-hard, meaning that there is no efficient algorithm for solving it on a large graph

Previous Attempts

- Summer 2010 – 255 titles
- Fall 2010 – 271 titles (845 words)
- Summer 2011 – 311 titles (997 words)
- Fall 2011 – 323 titles (1030 words)
- Spring 2012 – 327 titles (1055 words)

Approach

- Algorithms
- Project Timeline (Gantt Chart)

Algorithms

① Brute Force

- Tried running on 16 GHC machines for 15 hours
- Constructed chain of 247 titles
- Progress slowed exponentially

Algorithms

1 Brute Force

- Tried running on 16 GHC machines for 15 hours
- Constructed chain of 247 titles
- Progress slowed exponentially

2 Acyclic Subgraphs

- A poly-time topo-sort algorithm is known for acyclic graphs
- Try to find acyclic subgraphs
- Too many cycles – took too long to generate subgraphs

Algorithms

1 Brute Force

- Tried running on 16 GHC machines for 15 hours
- Constructed chain of 247 titles
- Progress slowed exponentially

2 Acyclic Subgraphs

- A poly-time topo-sort algorithm is known for acyclic graphs
- Try to find acyclic subgraphs
- Too many cycles – took too long to generate subgraphs

3 Working backward

- Stuck at 247 titles using brute force
- Reverse graph edges and add to the beginning of the chain
- Work in progress – currently managed 274 titles

Evaluation

- 1 Length of the longest chain we find

Evaluation

- 1 Length of the longest chain we find
- 2 Compare performance of a different algorithms
 - ideally, decide on a “best” algorithm for the problem

Evaluation

- 1 Length of the longest chain we find
- 2 Compare performance of a different algorithms
 - ideally, decide on a “best” algorithm for the problem
- 3 Predict runtime for entire computation by solving tractable subproblems and extrapolating

Benefits

The members of our group will gain experience with

Benefits

The members of our group will gain experience with

Python	
working as a group toward a common goal	
handling and processing a large data set	
graph algorithms	
approximation algorithms for an NP-hard problem	

Table: Benefits of our project

Benefits

The members of our group will gain experience with

Python	✓
working as a group toward a common goal	
handling and processing a large data set	
graph algorithms	
approximation algorithms for an NP-hard problem	

Table: Benefits of our project

Benefits

The members of our group will gain experience with

Python	✓
working as a group toward a common goal	✓
handling and processing a large data set	
graph algorithms	
approximation algorithms for an NP-hard problem	

Table: Benefits of our project

Benefits

The members of our group will gain experience with

Python	✓
working as a group toward a common goal	✓
handling and processing a large data set	✓
graph algorithms	
approximation algorithms for an NP-hard problem	

Table: Benefits of our project

Benefits

The members of our group will gain experience with

Python	✓
working as a group toward a common goal	✓
handling and processing a large data set	✓
graph algorithms	✓ × $\frac{1}{2}$
approximation algorithms for an NP-hard problem	

Table: Benefits of our project

Benefits

The members of our group will gain experience with

Python	✓
working as a group toward a common goal	✓
handling and processing a large data set	✓
graph algorithms	✓ × $\frac{1}{2}$
approximation algorithms for an NP-hard problem	✗

Table: Benefits of our project

Summary

- 1 Team Members
- 2 Problem Introduction
- 3 Approach
 - Algorithms
- 4 Evaluation
- 5 Benefits
- 6 Summary

Sources

- Gantt Charts created using software from the Gantt Project
 - <http://www.ganttproject.biz/> (accessed June 4, 2013)
- Git repository hosted on GitHub
 - <https://github.com/>