Identifying the Greatest Tour de France Riders Through Network Science

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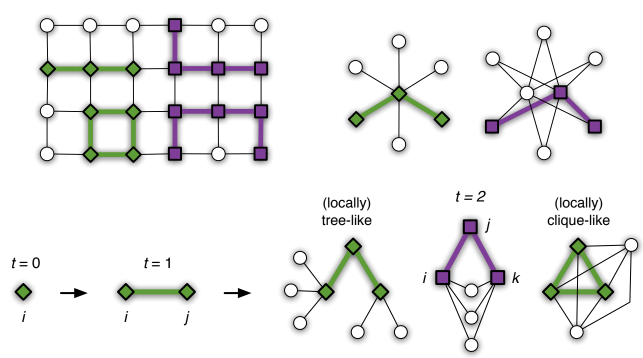

Fig. 1. Mandatory informative illustration highlighting main contributions. (1)

In this project, we constructed a directed multigraph to analyze over a century of Tour de France results (1903–2024). For each stage, a directed edge was created from every participant to all riders who placed ahead of them, forming a competitive hierarchy for that stage. By aggregating data from all stages across all editions of the race, we generated a massive multigraph capturing the cumulative performance dynamics of Tour de France participants. We then applied the PageRank algorithm to this graph to evaluate and rank riders based on the structure of competitive dominance inherent in their race history. This approach offers a novel perspective on historical performance, highlighting riders who consistently placed ahead of strong competitors, regardless of raw wins or podium finishes.

Introduction Tour de France is the most prestigious cycling event in the world. The multi-stage competition tests the best cyclists across various terrains, from flat sprints to punishing climbs. While general classification highlights the best overall cyclists, it misses certain cyclists who excel in specific domains such as consistent mountain climbers, sprinters and other stage specialists.

This project aims to accumulate all the Tour de France history by constructing a network that captures the relative performance of all riders in each stage from 1903 to 2024. In this network, each cyclist is connected via directed edges to those who placed ahead of them in a given stage. A single network is then constructed by merging all the data across all stages and editions; creating a multigraph. To account for different interpretations of performance, we create multiple versions of this multigraph; each applying a different edge weighting method.

To find the most successful riders we apply the PageRank algorithm to our multigraphs which enables us to find even the lesser known riders who specialise in certain types of stages.

Related work

Relevant literature ($\approx$ 10 references). Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetuer.

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Results

Main results supported by math, plots, tables, diagrams etc. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

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All authors contributed equally to this work.

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Table 1. Table describing data or methods.

	n	m	$\langle k\rangle$	$\langle C\rangle$	$\langle d\rangle$
Fine network	438 920	9 742 733	44.4	0.37	6.19
Random graph	438 920	9 781 609	44.6	0.00	4.92

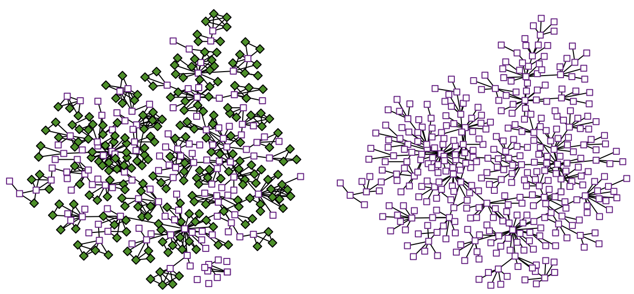

Fig. 2. Figure showing interesting examples. (1)

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Discussion

Summary of results, main contributions, final conclusions, future work etc. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

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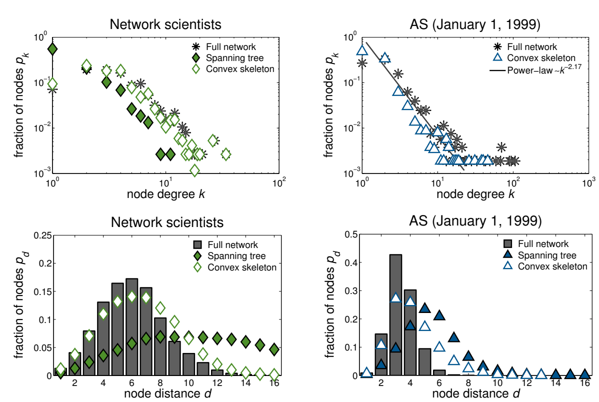

Fig. 3. Figure showing relevant results. (1)

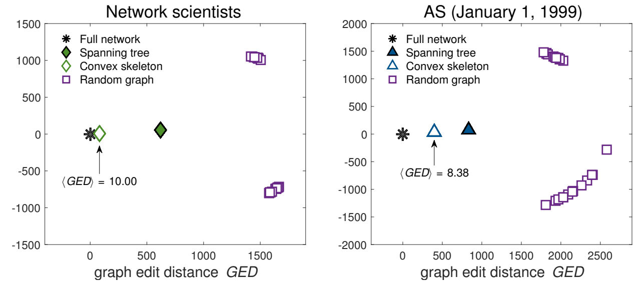

Fig. 4. Another figure with results. (1)

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Methods

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$$\phi_v = \Pr(X_{st}(v) = 1) = \Pr(X_{sv} = 1)\Pr(X_{vt} = 1) \quad [1]$$

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Require: graph G, cutoff k_{min}
Ensure: power-law γ
$s \leftarrow n \leftarrow 0$
for nodes $i \in N$ **do**
  if $k_i \geq k_{min}$ **then**
    $s \leftarrow s + \ln k_i/(k_{min} - 0.5)$
    $n \leftarrow n + 1$
return $1 + ns^{-1}$

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