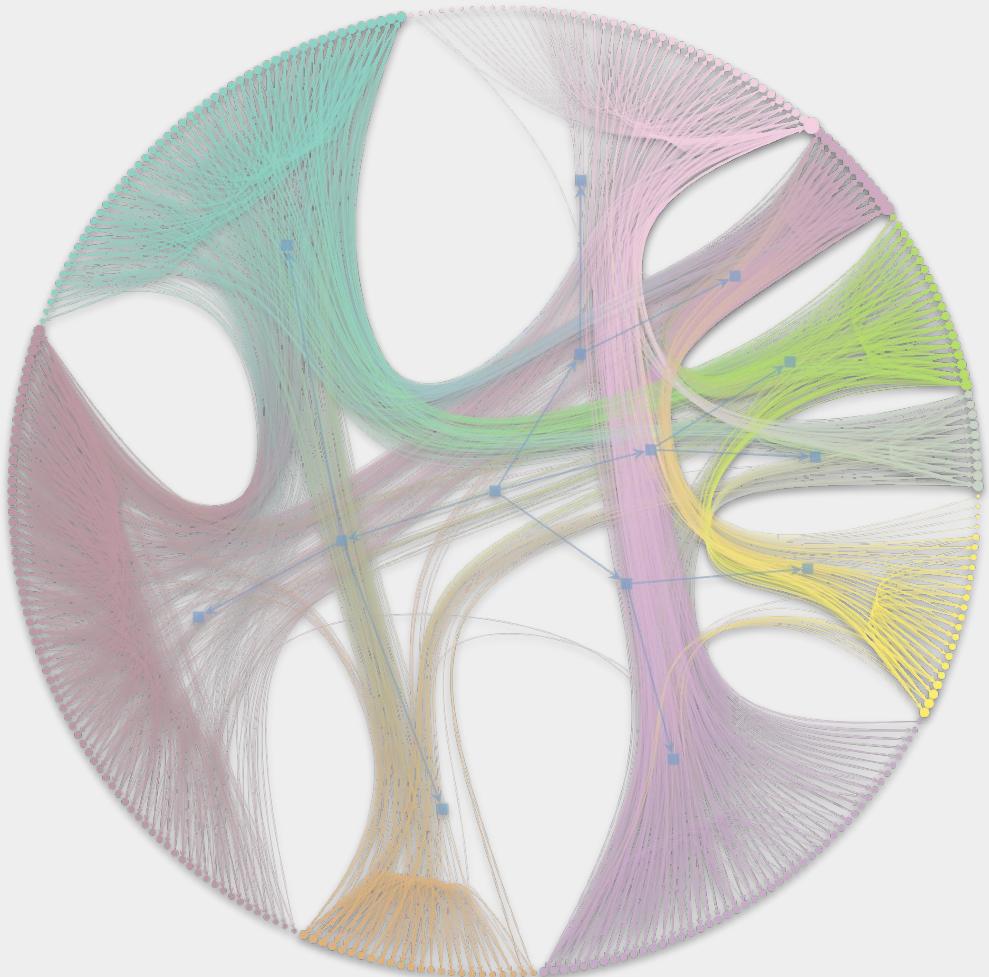


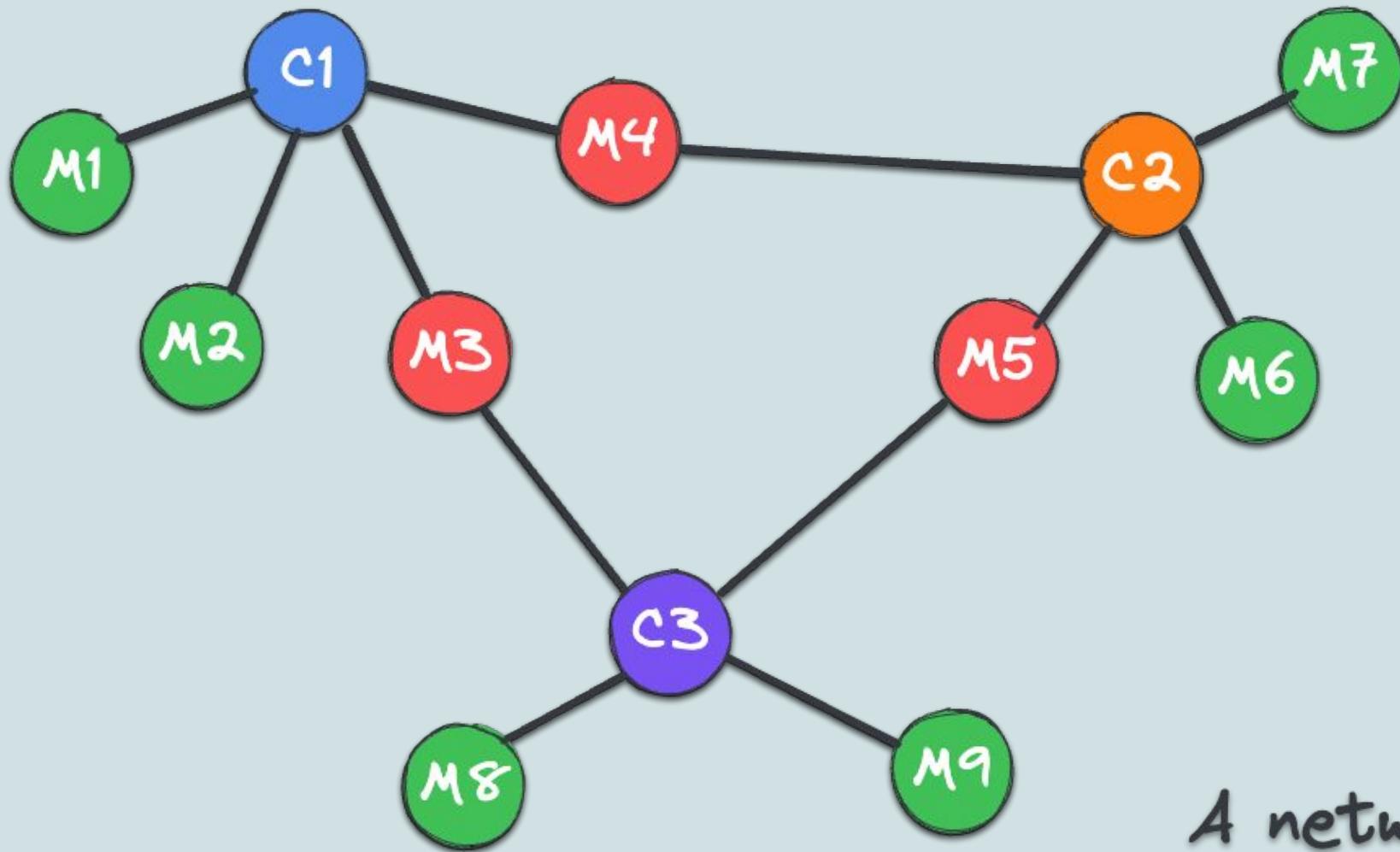
Network Elements

Part 01

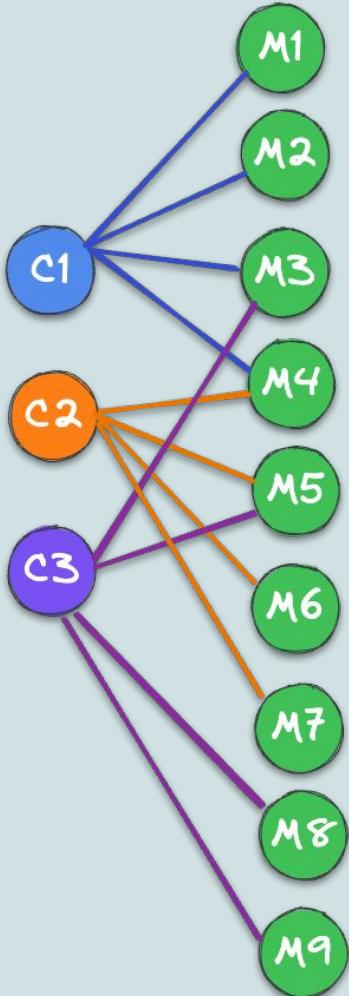
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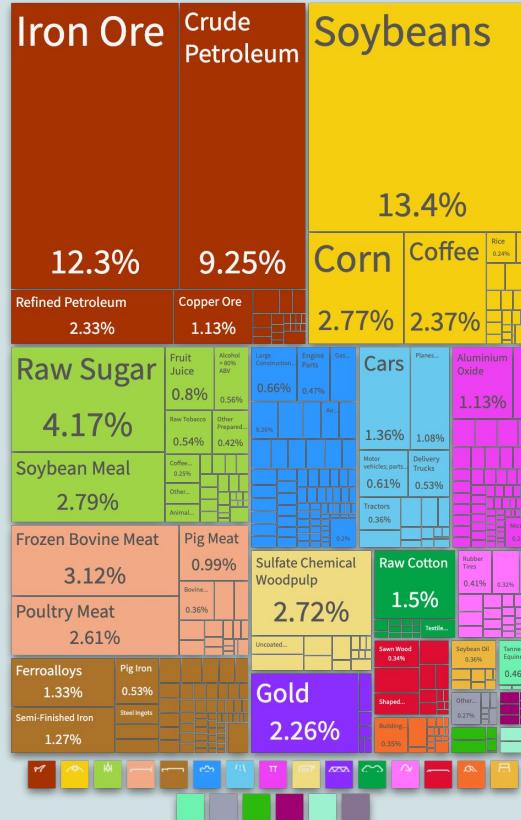




A network

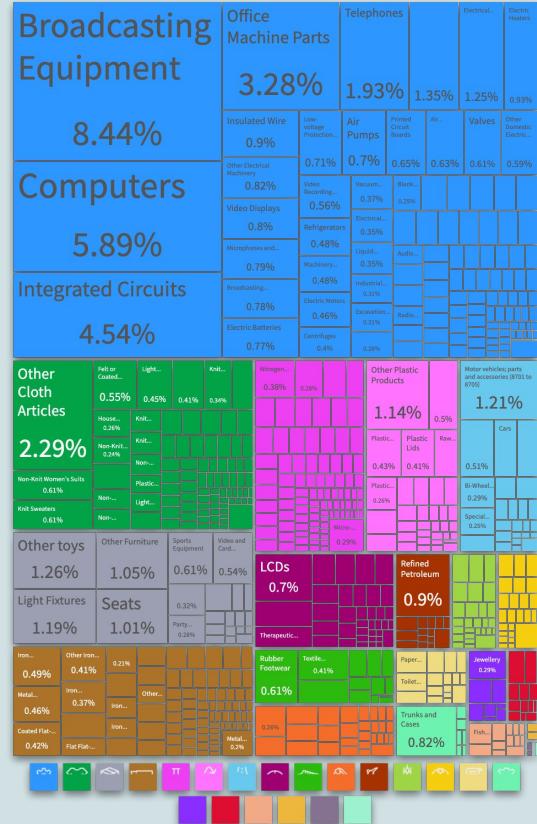


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[Click to Select a Product]
Total: \$214B

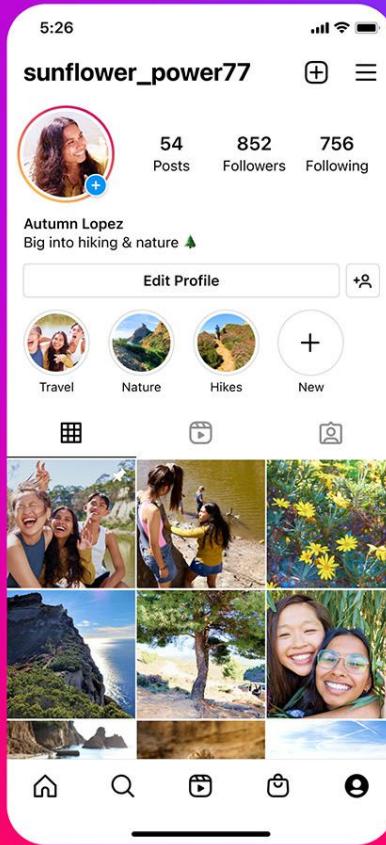
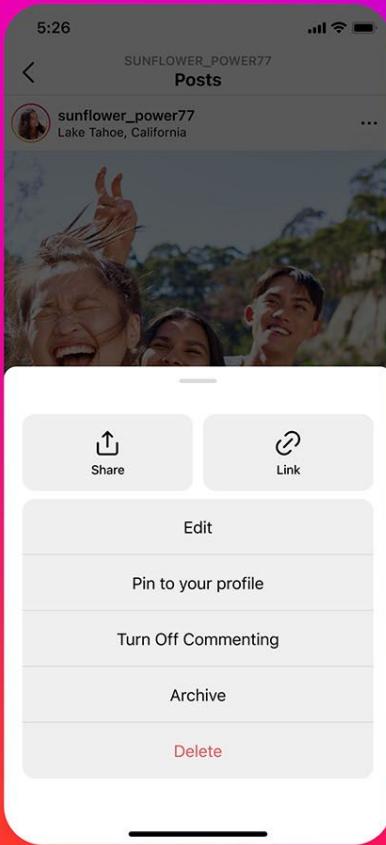


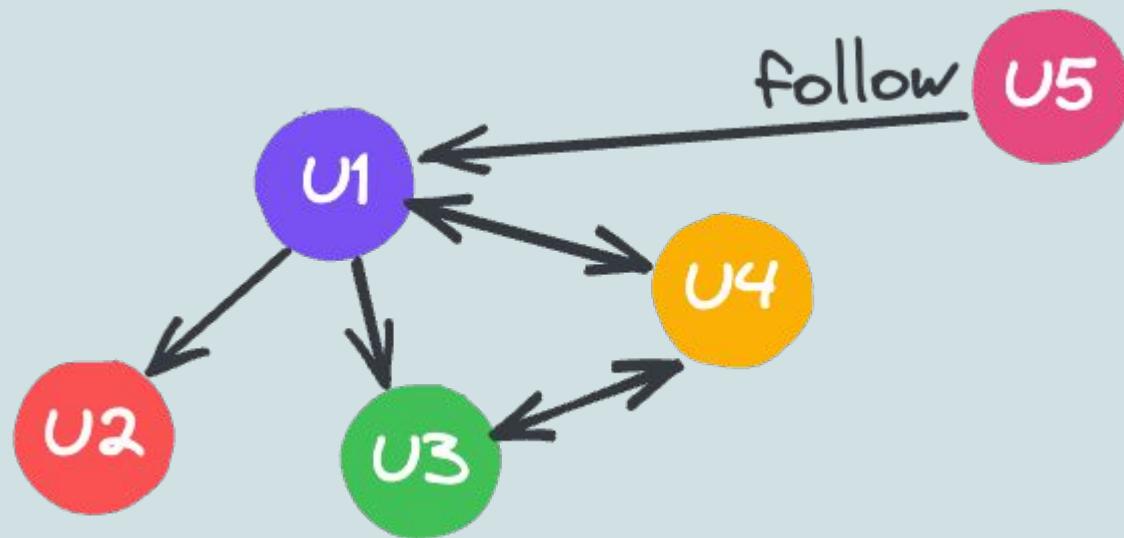
bipartite network

Exports (2020)
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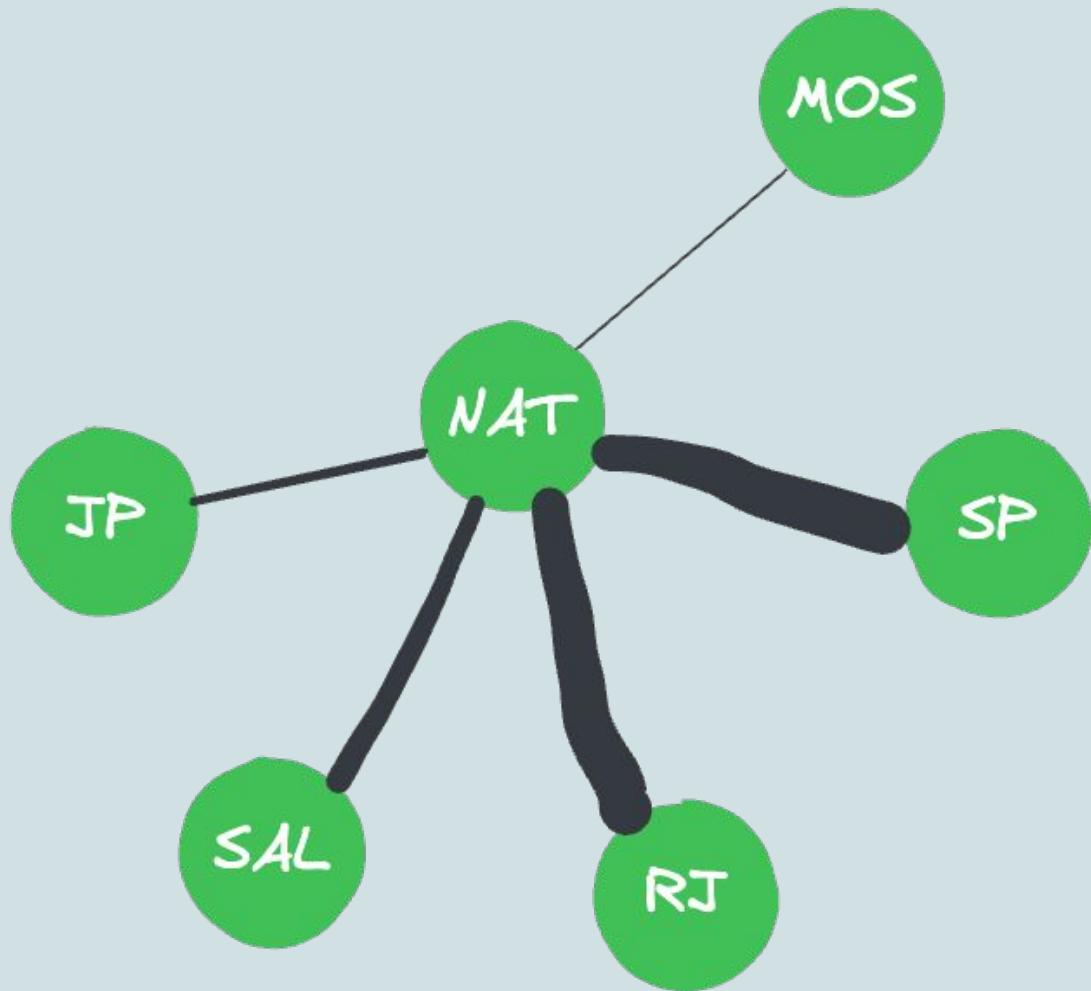


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dataset-flights-brazil

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Code

alvarofpp style: Applies linters

738139c · 2 months ago

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data

chore: Updates data files

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Dockerfile

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docs: Adds LICENSE

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Makefile

refact: Makefile

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README.md

fix: Write the same file twice

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docker-compose.yml

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2 months ago

extract.py

style: Applies linters

2 months ago

requirements.txt

build: Adds Docker and Makefile

2 months ago

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flights air-traffic graphml

air-traffic-data

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Report repository

Languages





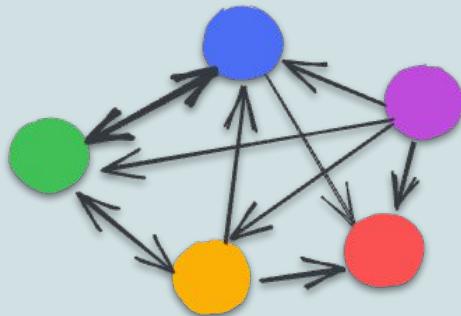
WhatsApp



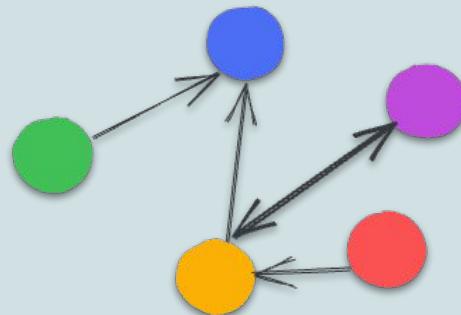
GitHub

<https://github.com/kurasaitja/Whatsapp-Analysis>

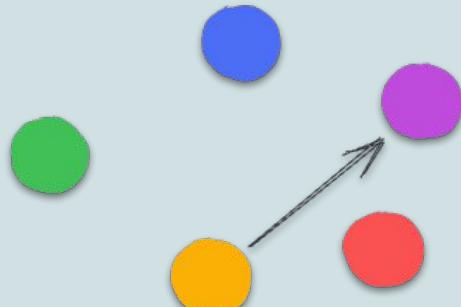
Monday



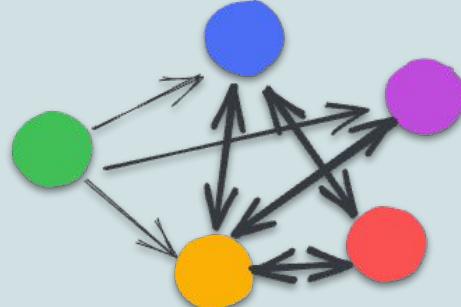
Tuesday



Wednesday



Thursday



Temporal network



Jure Leskovec

[FOLLOW](#)

Professor of Computer Science, [Stanford University](#).

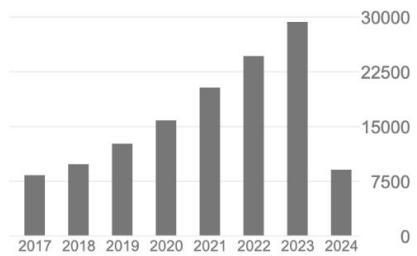
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Co-authors

Rex (Zhitao) Ying
Yale University

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CMU

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node2vec: Scalable feature learning for networks A Grover, J Leskovec Proceedings of the 22nd ACM SIGKDD international conference on Knowledge ...	11638	2016
How powerful are graph neural networks? K Xu, W Hu, J Leskovec, S Jegelka arXiv preprint arXiv:1810.00826	7188	2018
SNAP Datasets: Stanford large network dataset collection J Leskovec, A Krevl	4328	2014
Friendship and mobility: user movement in location-based social networks E Cho, SA Myers, J Leskovec Proceedings of the 17th ACM SIGKDD international conference on Knowledge ...	3606	2011
Graph convolutional neural networks for web-scale recommender systems R Ying, R He, K Chen, P Eksombatchai, WL Hamilton, J Leskovec Proceedings of the 24th ACM SIGKDD international conference on knowledge ...	3472	2018
Graph evolution: Densification and shrinking diameters J Leskovec, J Kleinberg, C Faloutsos ACM transactions on Knowledge Discovery from Data (TKDD) 1 (1), 2-es	3253	2007
Graphs over time: densification laws, shrinking diameters and possible explanations J Leskovec, J Kleinberg, C Faloutsos	3234	2005



AI for Relational Data



Generate and deploy highly accurate predictions in hours - not months

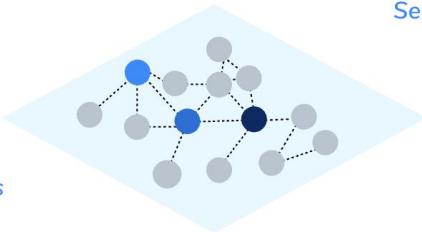


+
Relationships

Data

1. Data

Bridge together diverse and disparate data silos regardless of data type, such as structured, unstructured, and semi-structured.



Graph
Dynamic Context

2. Graph

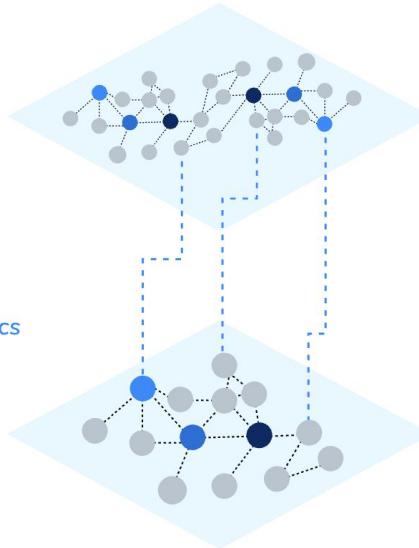
Map data and draw connections among them for the first layer of dynamic context, which provides immediate understanding.

+
Semantics

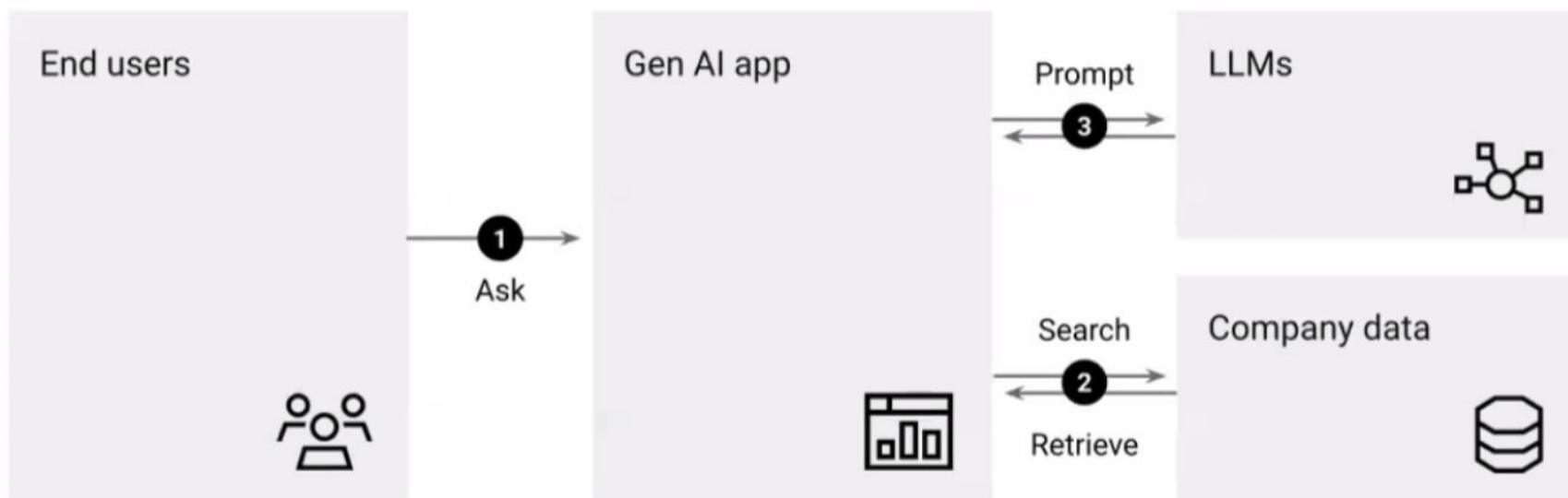
Knowledge Graph
Deep Dynamic Context

3. Semantics

Apply semantics to provide deeper context to connected data. The deeper the context, the more powerful the insights.



Retrieval Augmented Generation (RAG)





Xavier Bresson

[FOLLOW](#)

Assoc Prof of Computer Science, [NUS](#) & Distinguished Researcher at Element Inc
Verified email at nus.edu.sg - [Homepage](#)

Graph Neural Networks Deep Learning Theory Large Language Models Graph Theory Optimization

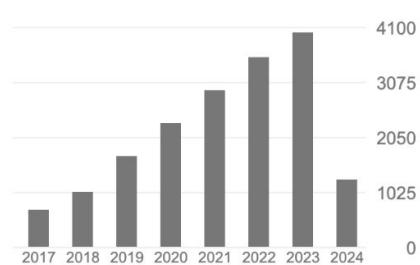
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Convolutional neural networks on graphs with fast localized spectral filtering M Defferrard, X Bresson, P Vandergheynst Advances in neural information processing systems 29	8826	2016
Fast global minimization of the active contour/snake model X Bresson, S Esedoḡlu, P Vandergheynst, JP Thiran, S Osher Journal of Mathematical Imaging and vision 28 (2), 151-167	1188	2007
Benchmarking graph neural networks VP Dwivedi, CK Joshi, T Laurent, Y Bengio, X Bresson Journal of Machine Learning Research (JMLR)	902	2020
Structured sequence modeling with graph convolutional recurrent networks Y Seo, M Defferrard, P Vandergheynst, X Bresson Neural Information Processing: 25th International Conference, ICONIP 2018 ...	836	2018
Bregmanized nonlocal regularization for deconvolution and sparse reconstruction X Zhang, M Burger, X Bresson, S Osher SIAM Journal on Imaging Sciences 3 (3), 253-276	797	2010
Caylenets: Graph convolutional neural networks with complex rational spectral filters R Levie, F Monti, X Bresson, MM Bronstein IEEE Transactions on Signal Processing 67 (1), 97-109	725	2018
Geometric matrix completion with recurrent multi-graph neural networks F Monti, M Bronstein, X Bresson Advances in neural information processing systems 30	631	2017
Geometric applications of the split Bregman method: segmentation and surface reconstruction	594	2010

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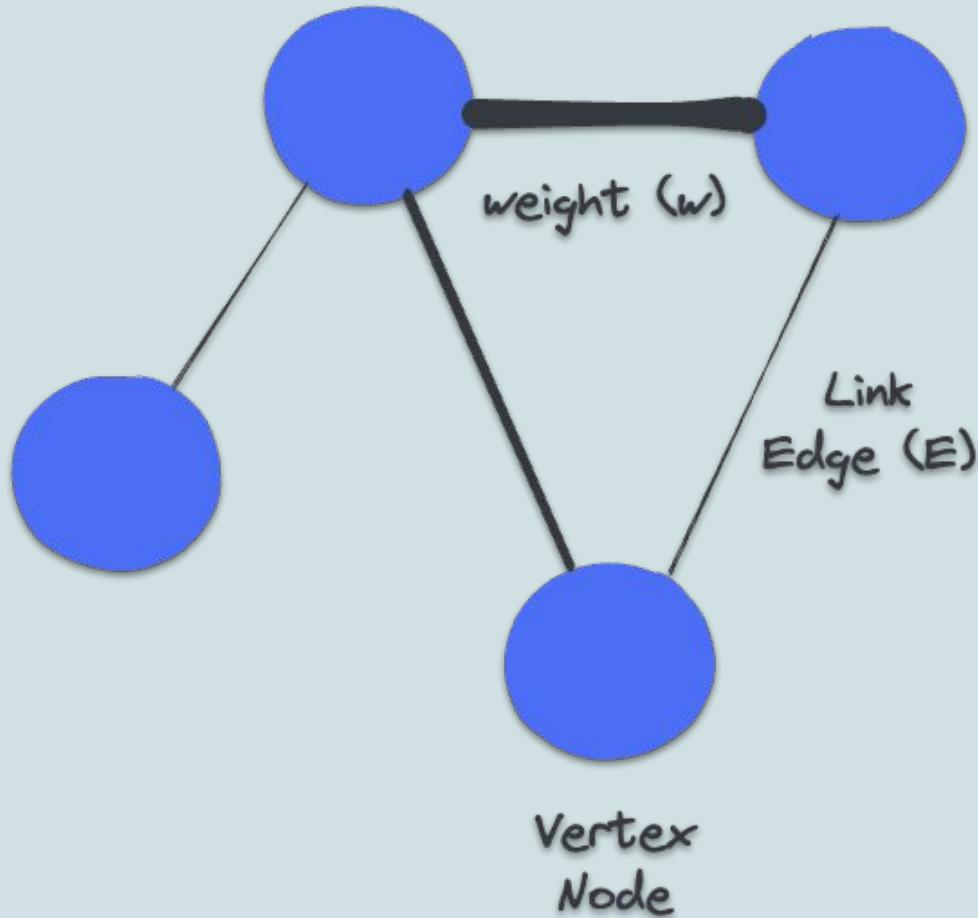
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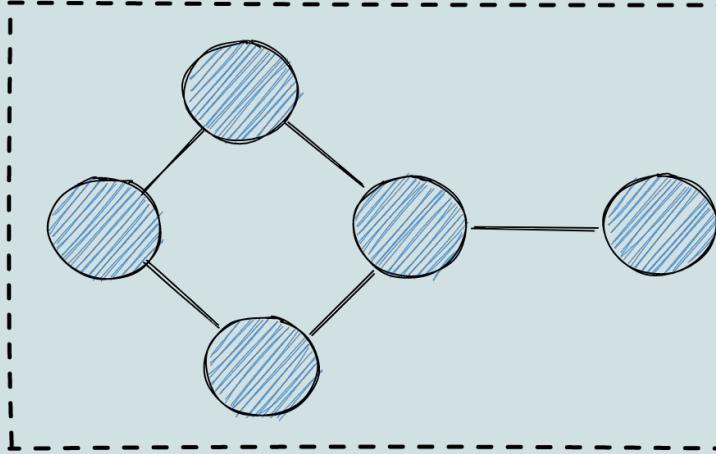
Basic Definitions

$$G = (V, E, W)$$

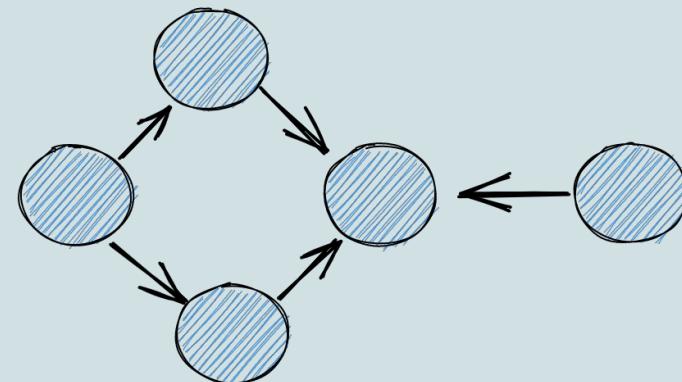
$$E \subseteq V \times V$$

$$W \subseteq R^+$$

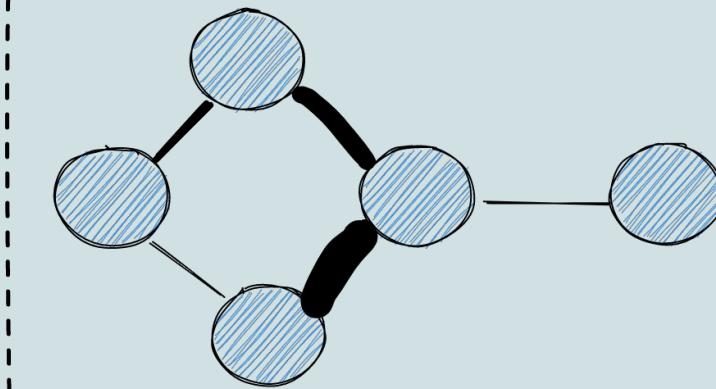
Undirected



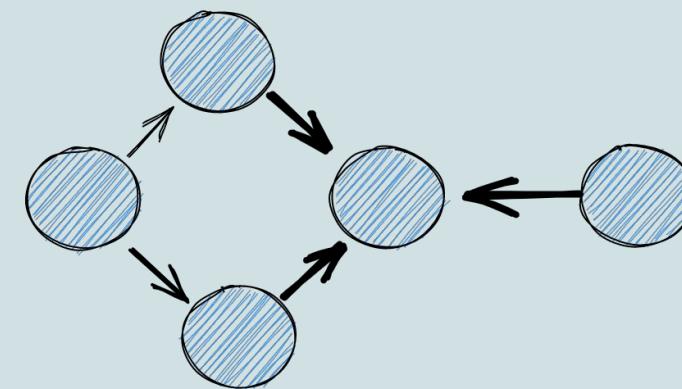
Directed



Unweighted



Weighted



Knowing

Information is directly acquired from reliable sources such as books, teachers, lectures, and courses

Focus on absorbing and retaining information.

Learning that takes place when information or experiences are exchanged between individuals or groups.

Teaching others reinforces one's own understanding.

Sharing

Learning

Discovering

Self-directed learning that happens when one ventures out to find new information

Driven by curiosity and inherently exploratory.

"Learning by doing", based on the premise that direct experience is one of the most potent forms of learning.

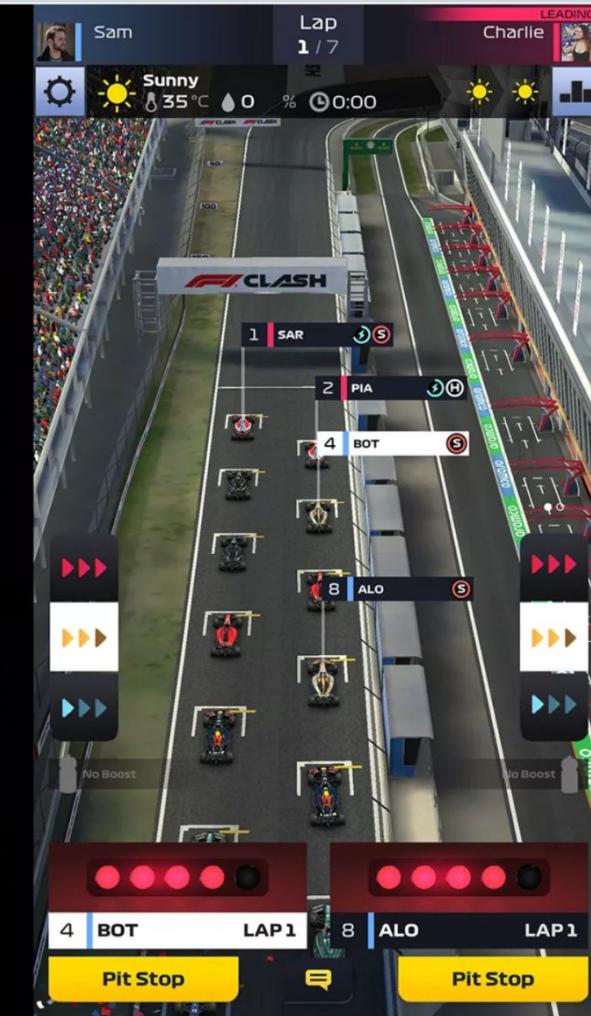
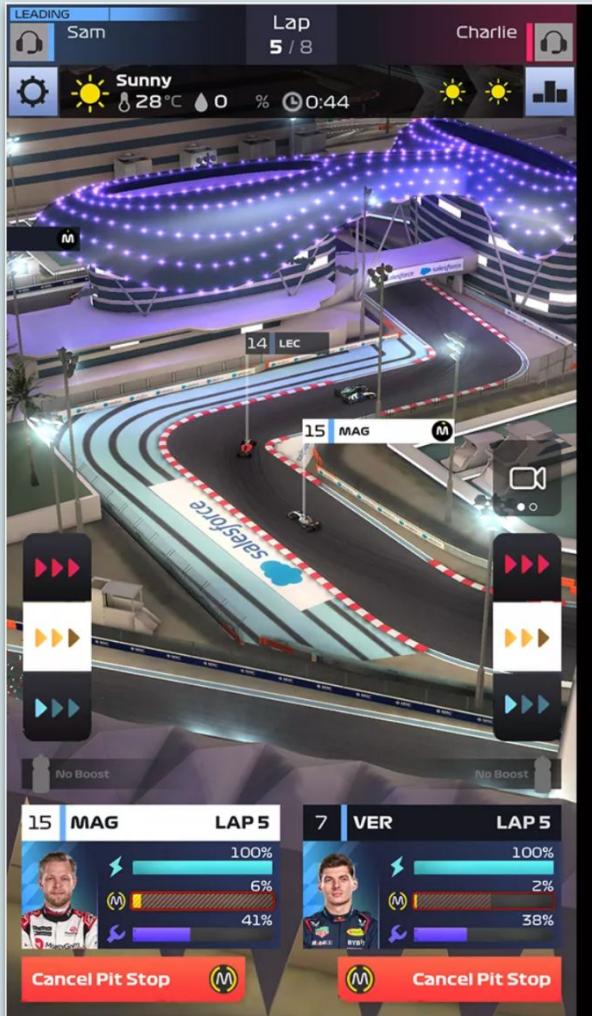
Involves real-life situations

Experiencing

 F1® CLASH**F1® CLASH** F1® CLASH

Compete in thrilling 1v1 races with the toughest rival race drivers from around the world.







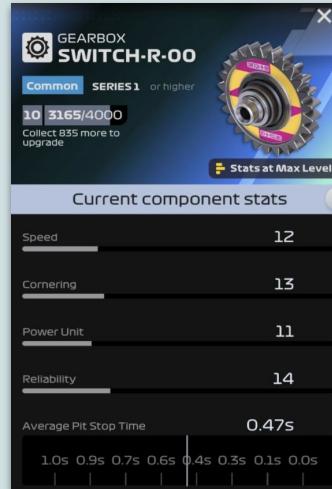
Configuring a setup

$\min(1,220)$

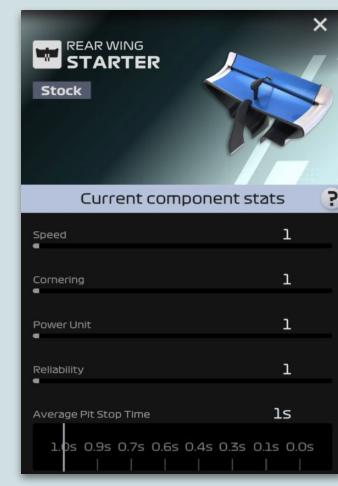
Breaks



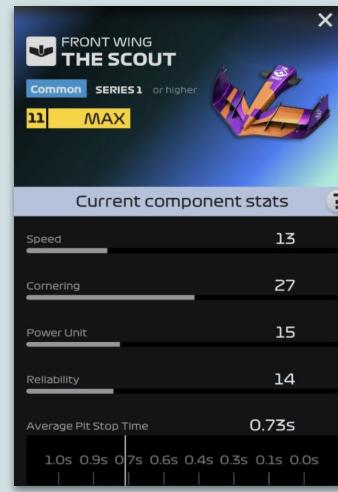
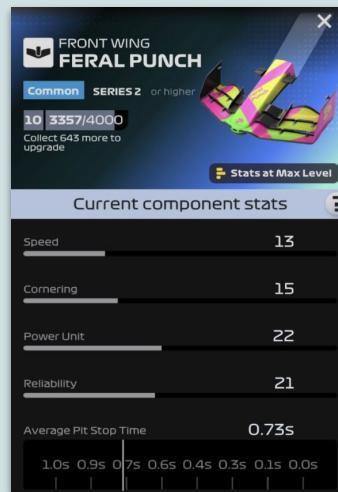
GearBox



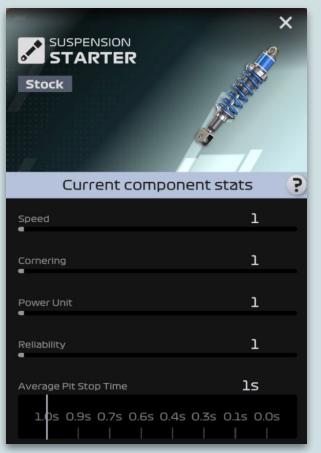
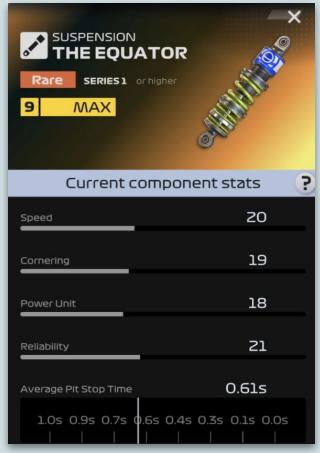
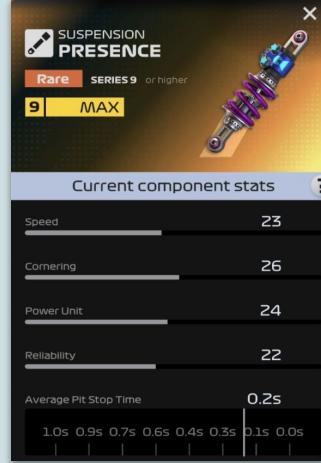
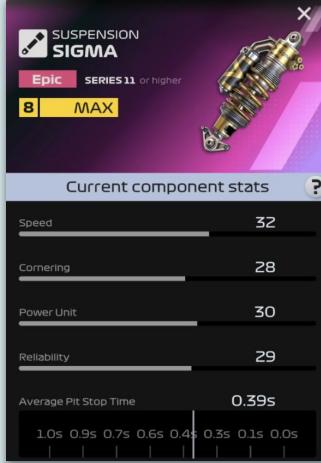
Rear wing



Front wing

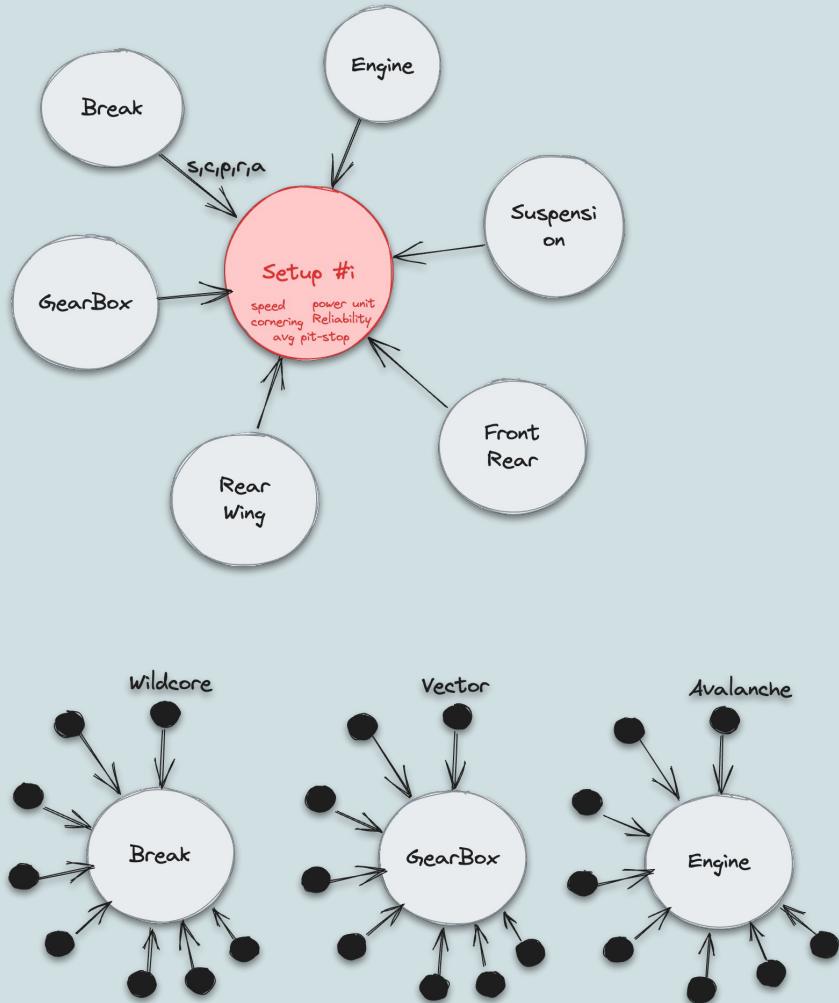


Suspension



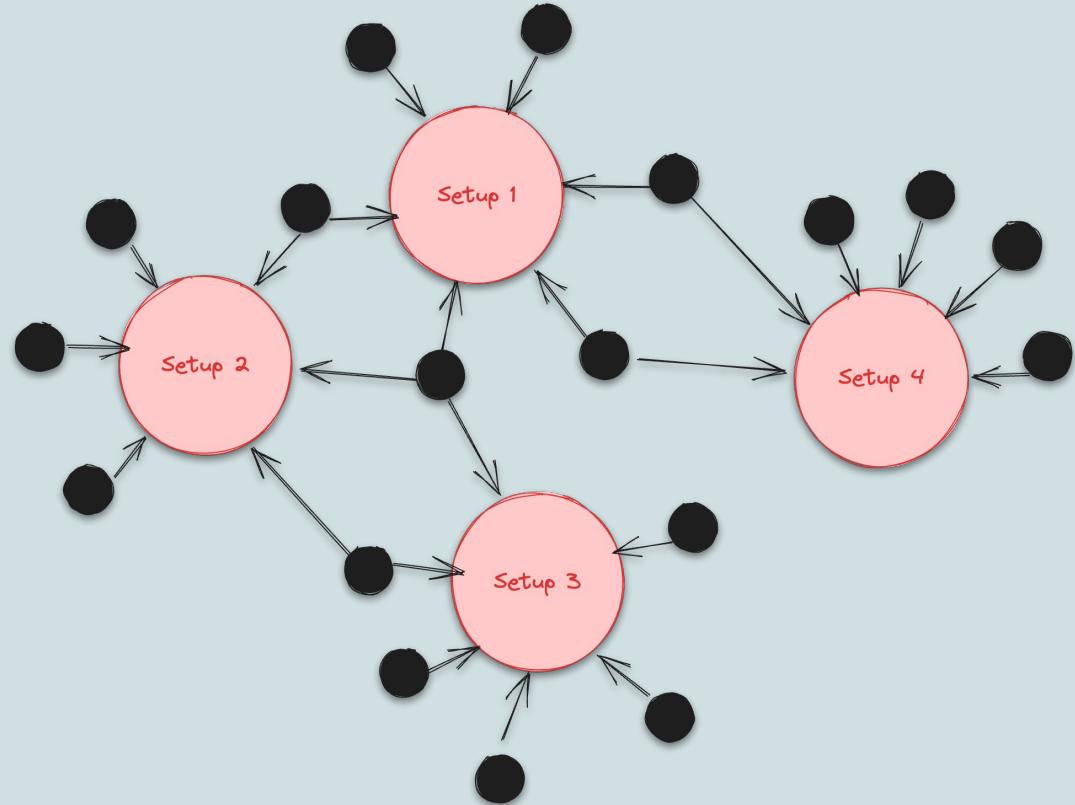
Engine



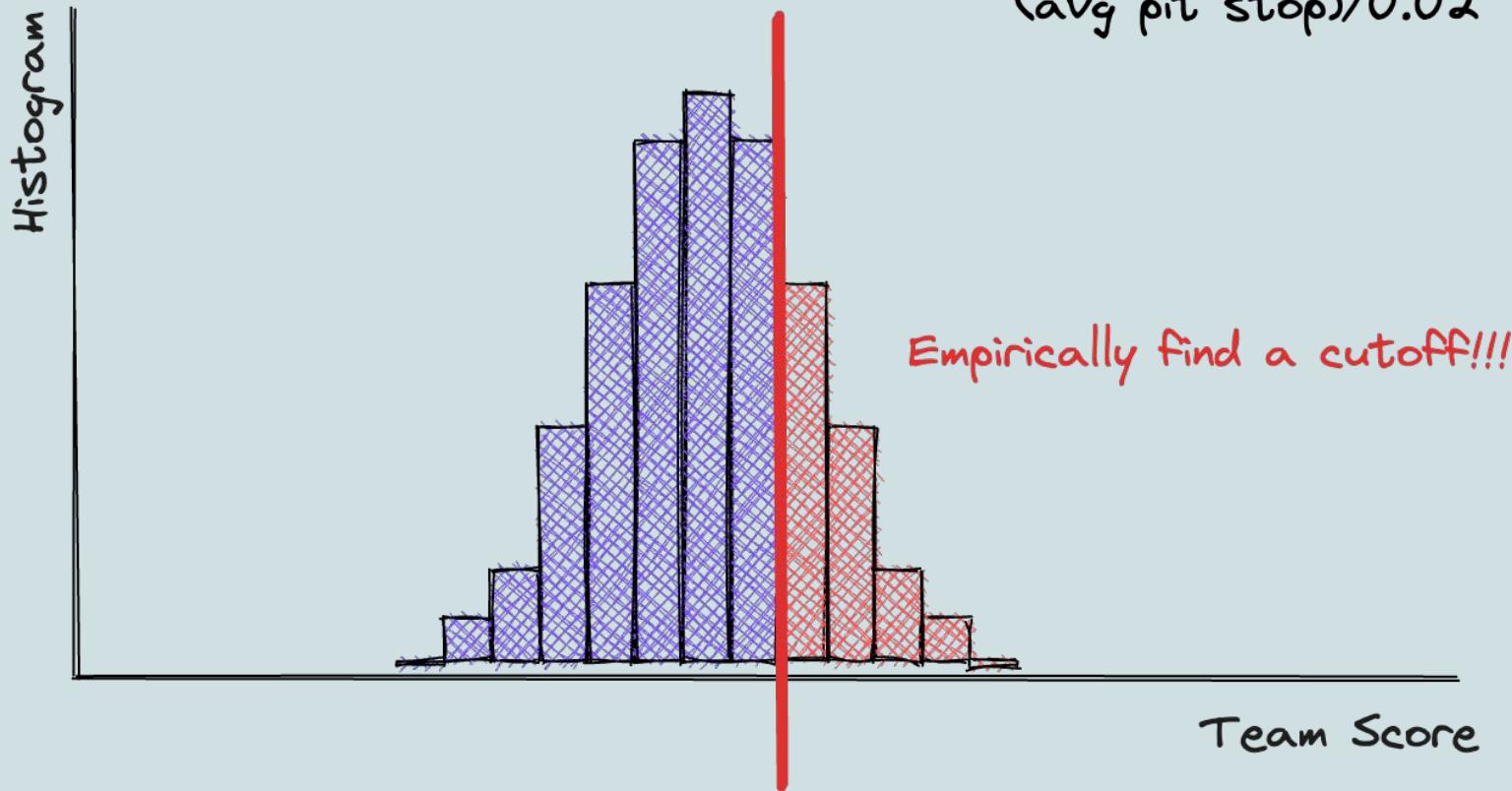




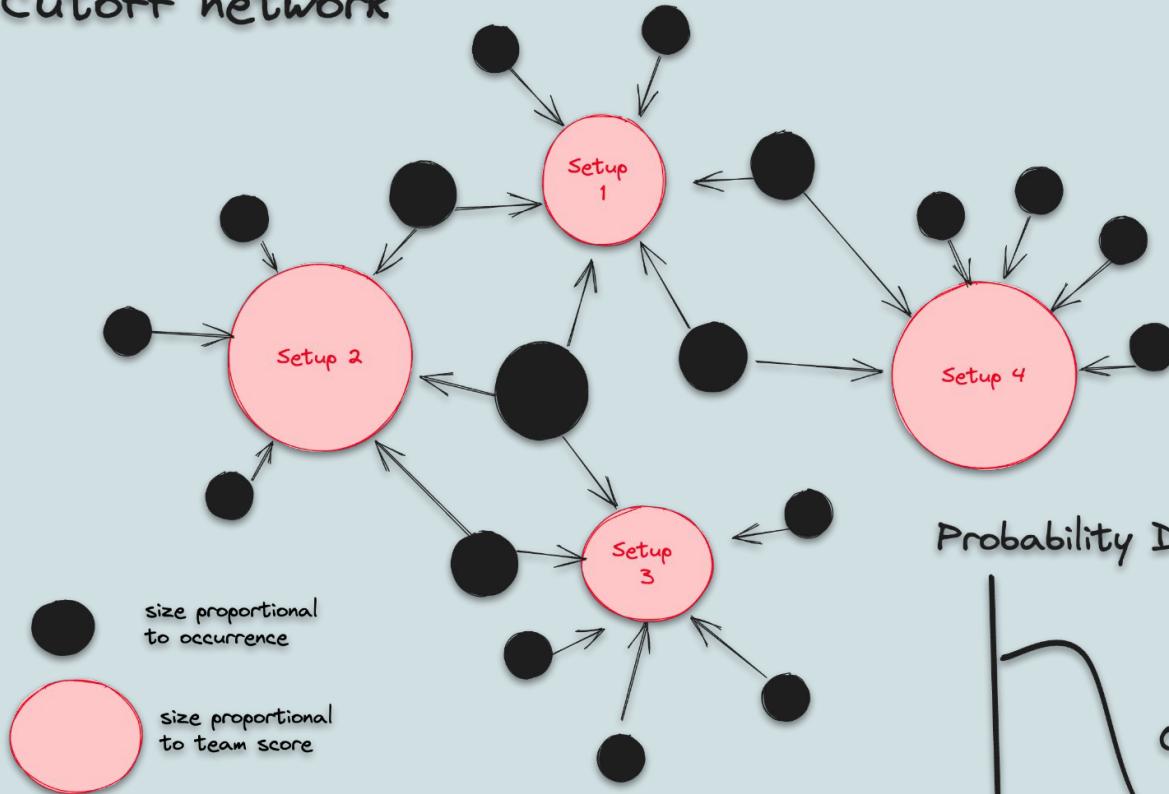
$8^6 = 262,144$
combinations



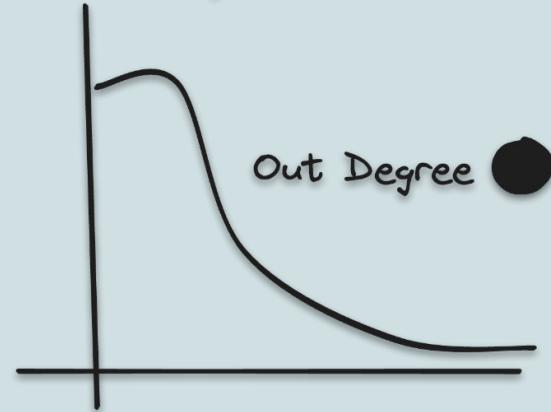
Team Score = speed + cornering + power unit + reliability +
(avg pit stop)/0.02

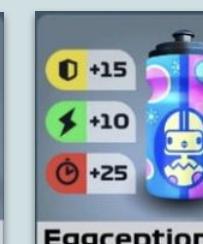
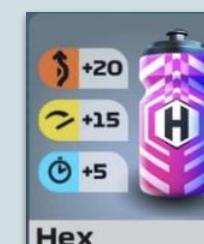
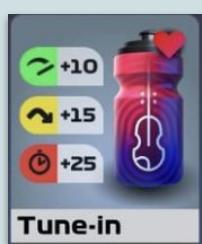
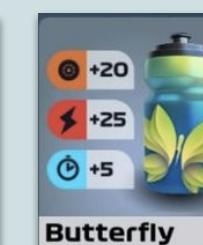


Cutoff network



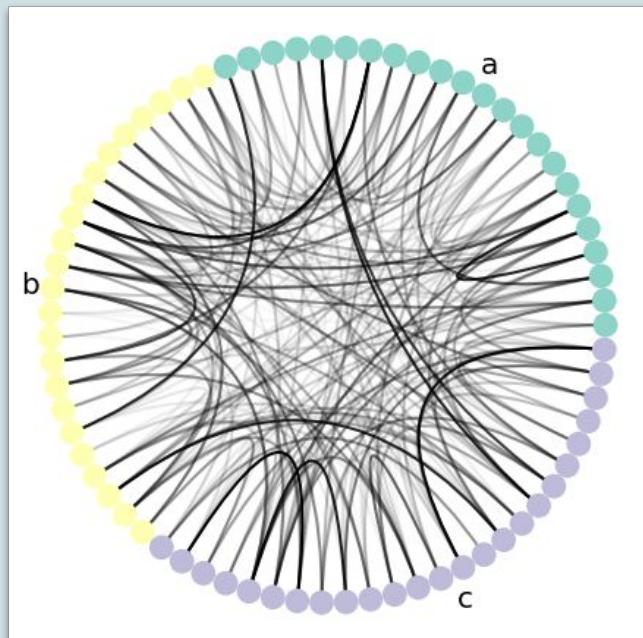
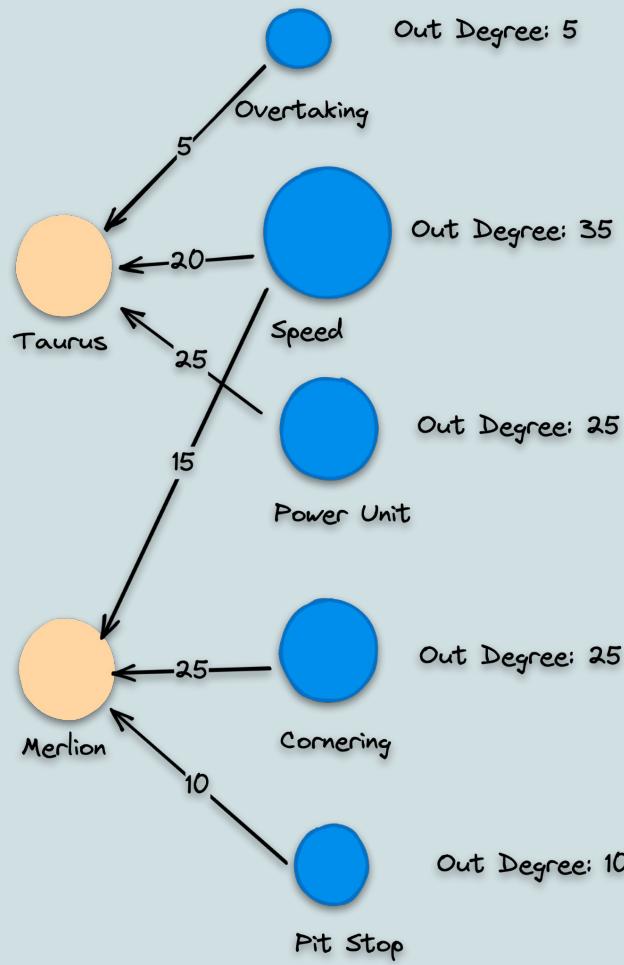
Probability Distribution Function (PDF)

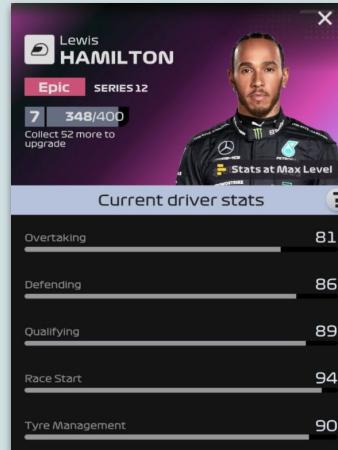






Speed, Cornering, Power_Unit, Reliability, Pit_Stop,
Overtaking, Defending, Race_Start, Tyre_Management





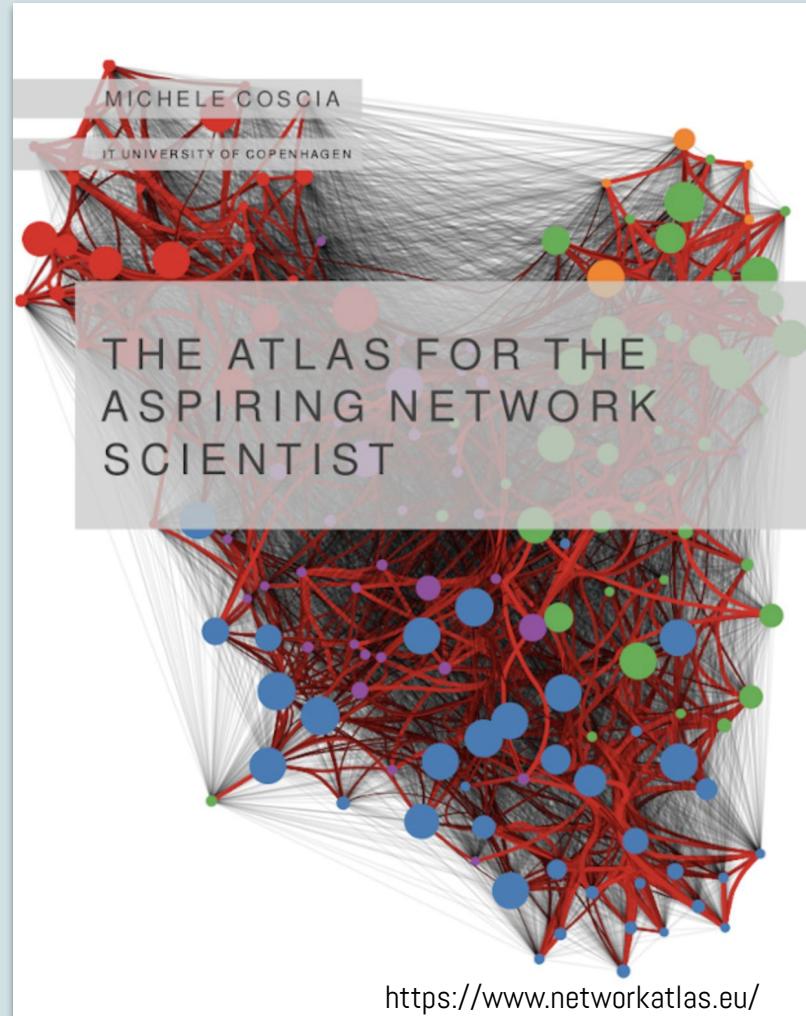
$$\min(\lceil \times 1, 99 \rceil)$$

Further Reading



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NetworkX is a Python package for the creation, manipulation, and study of the structure, dynamics, and functions of complex networks.

Software for complex networks

- Data structures for graphs, digraphs, and multigraphs
- Many standard graph algorithms
- Network structure and analysis measures
- Generators for classic graphs, random graphs, and synthetic networks
- Nodes can be "anything" (e.g., text, images, XML records)
- Edges can hold arbitrary data (e.g., weights, time-series)
- Open source [3-clause BSD license](#)
- Well tested with over 90% code coverage
- Additional benefits from Python include fast prototyping, easy to teach, and multi-platform

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