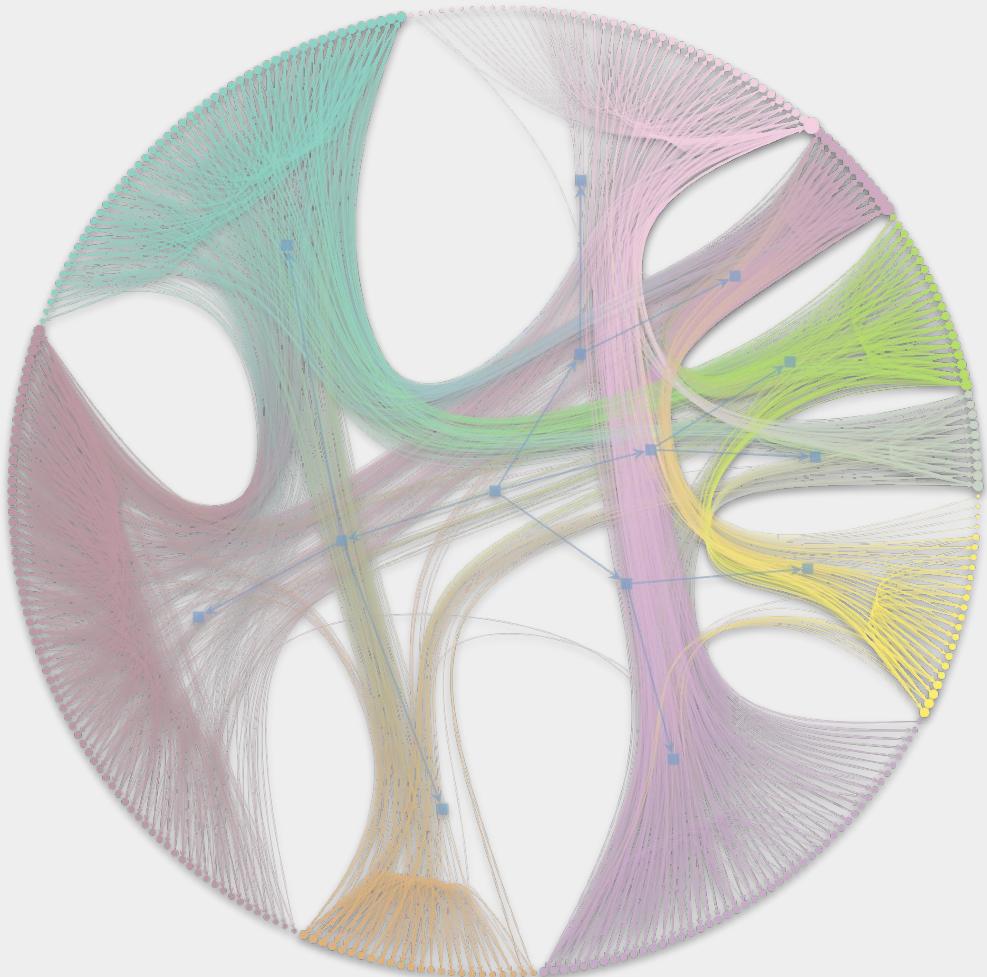


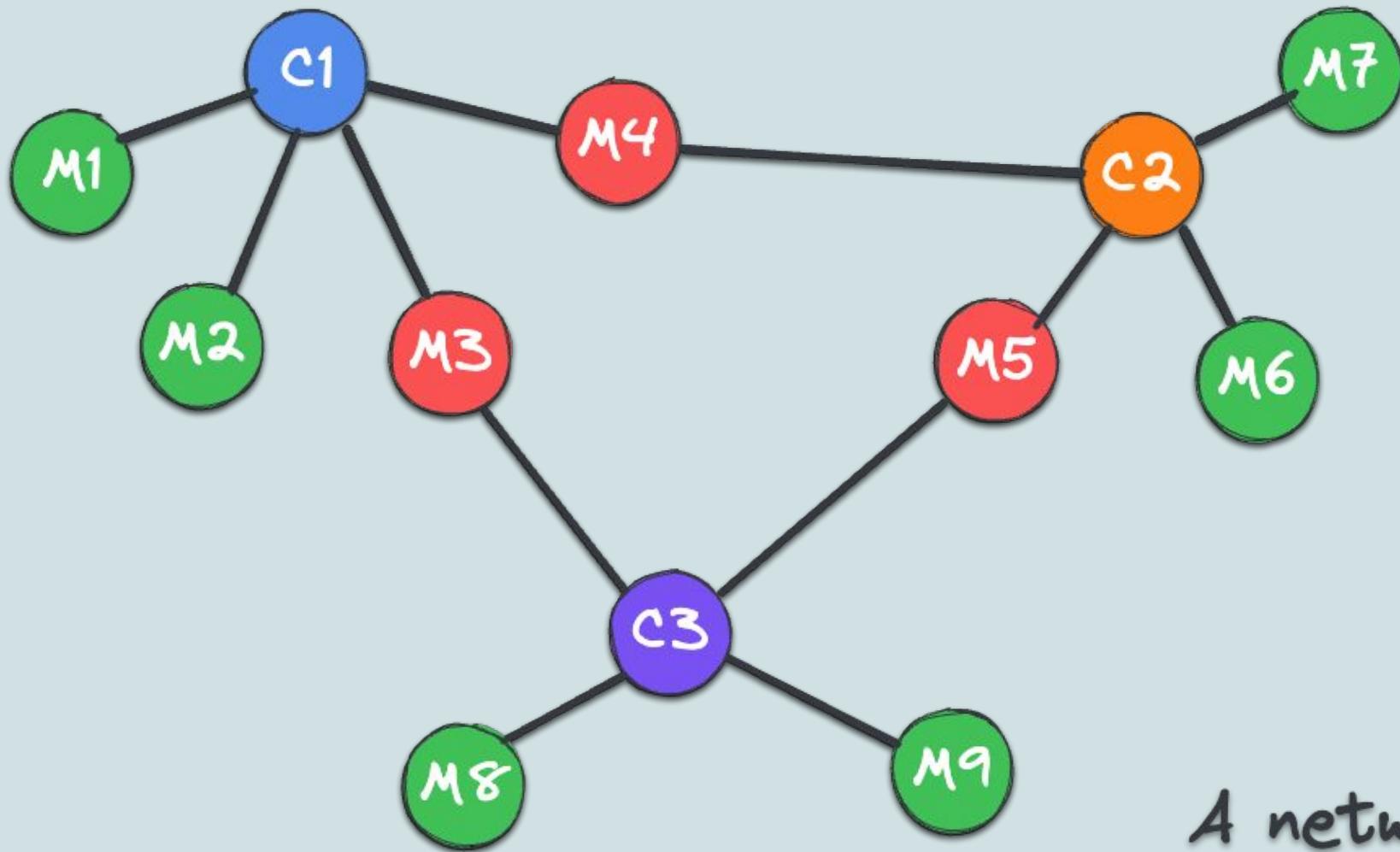
Network Elements

Part 01

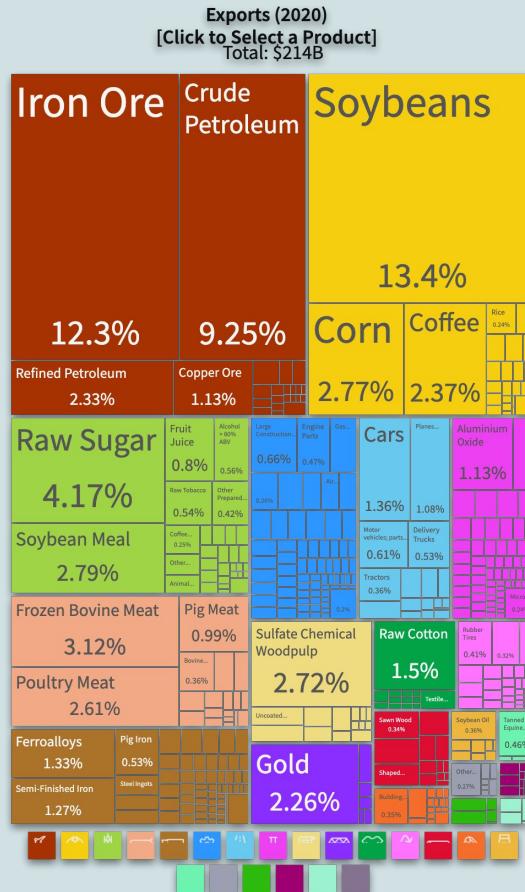
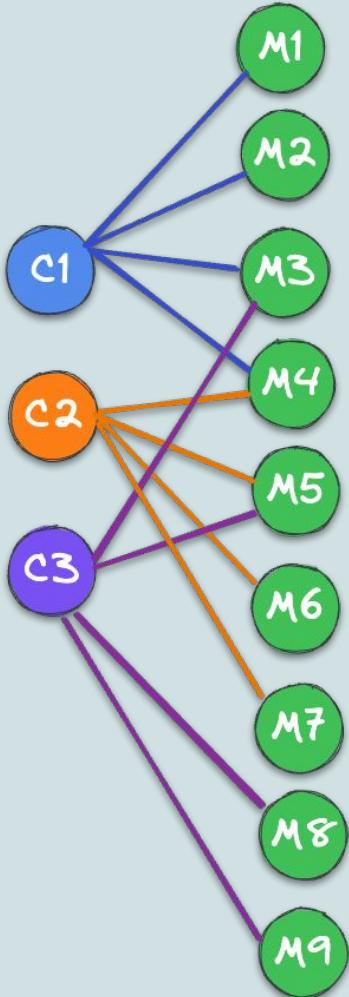
ivanovitch.silva@ufrn.br
@ivanovitchm



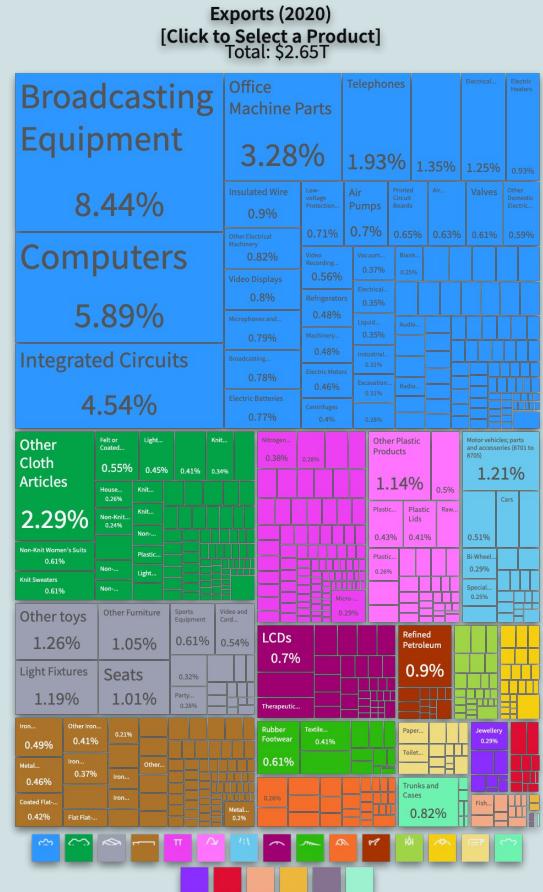




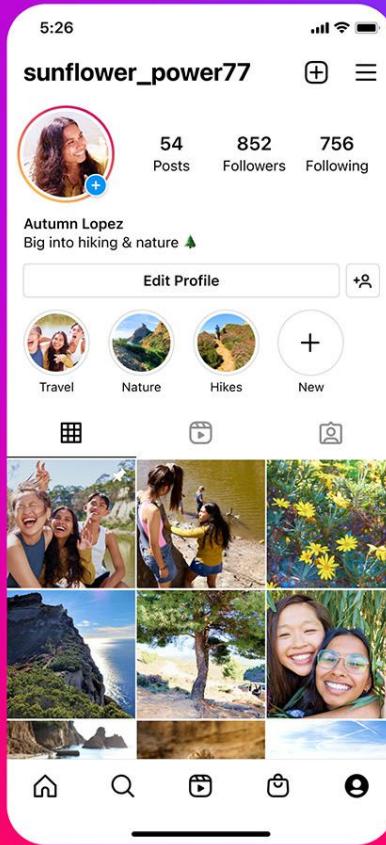
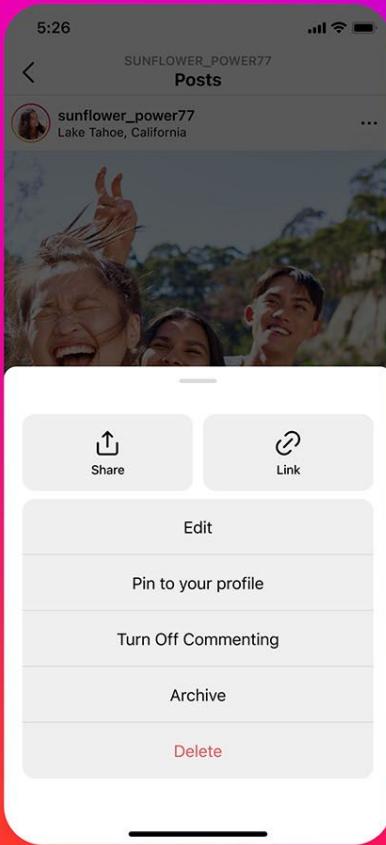
A network

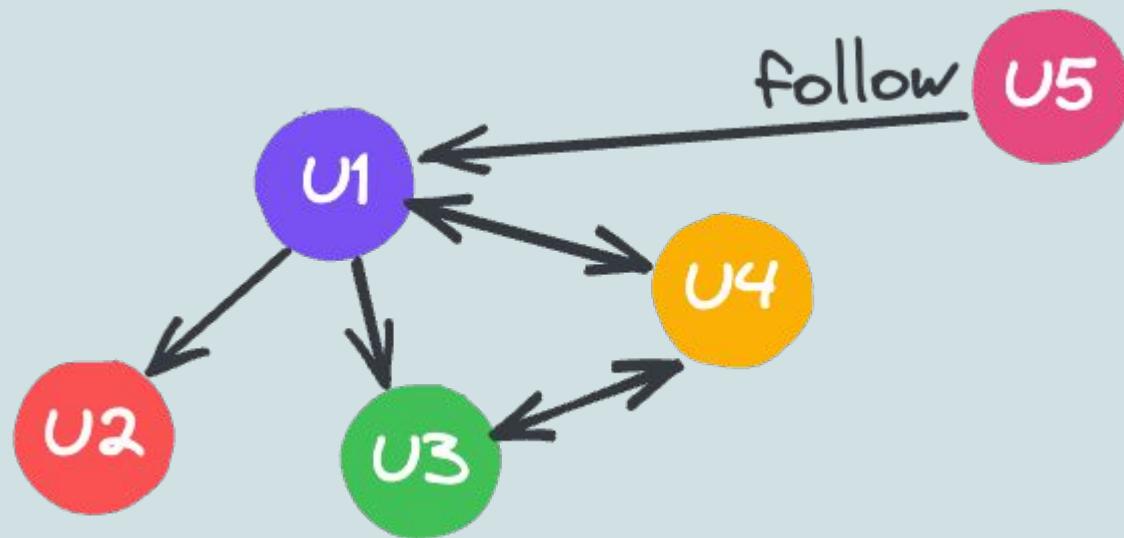


bipartite network

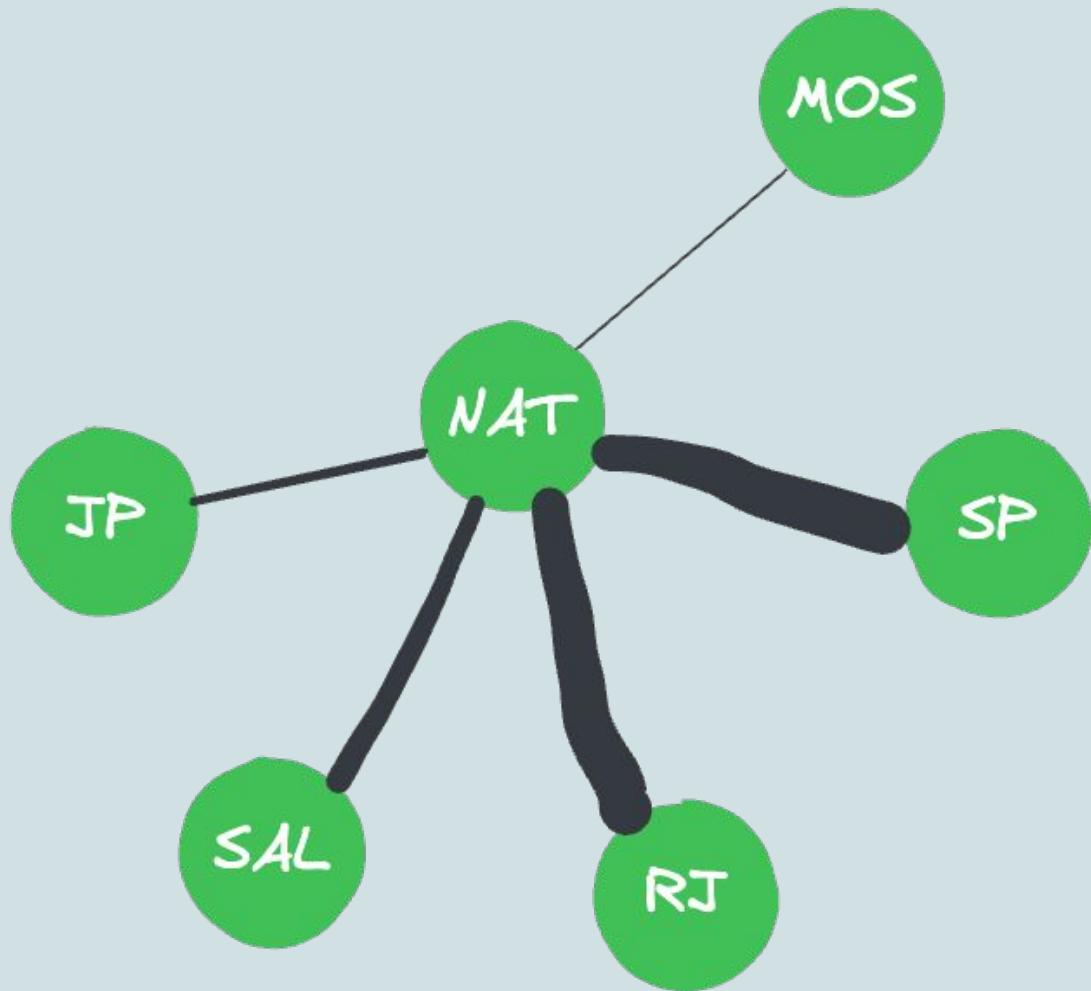


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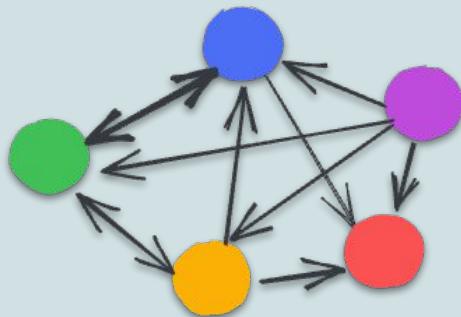
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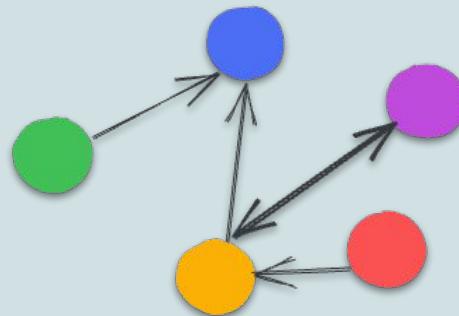
GitHub

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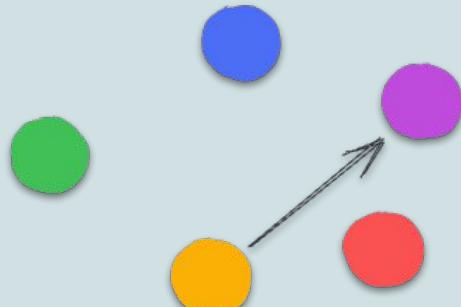
Monday



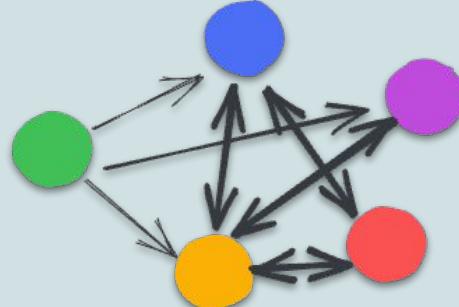
Tuesday



Wednesday



Thursday



Temporal network



Jure Leskovec

[FOLLOW](#)

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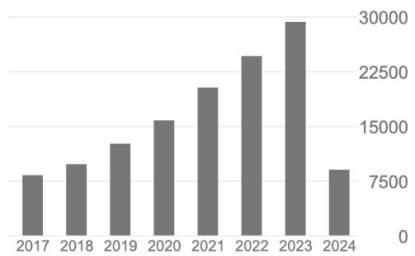
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How powerful are graph neural networks? K Xu, W Hu, J Leskovec, S Jegelka arXiv preprint arXiv:1810.00826	7188	2018
SNAP Datasets: Stanford large network dataset collection J Leskovec, A Krevl	4328	2014
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Graph 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



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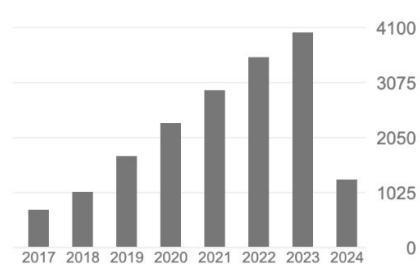
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Fast global minimization of the active contour/snake model X Bresson, S Esedoḡlu, P Vandergheynst, JP Thiran, S Osher Journal of Mathematical Imaging and vision 28 (2), 151-167	1188	2007
Benchmarking graph neural networks VP Dwivedi, CK Joshi, T Laurent, 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
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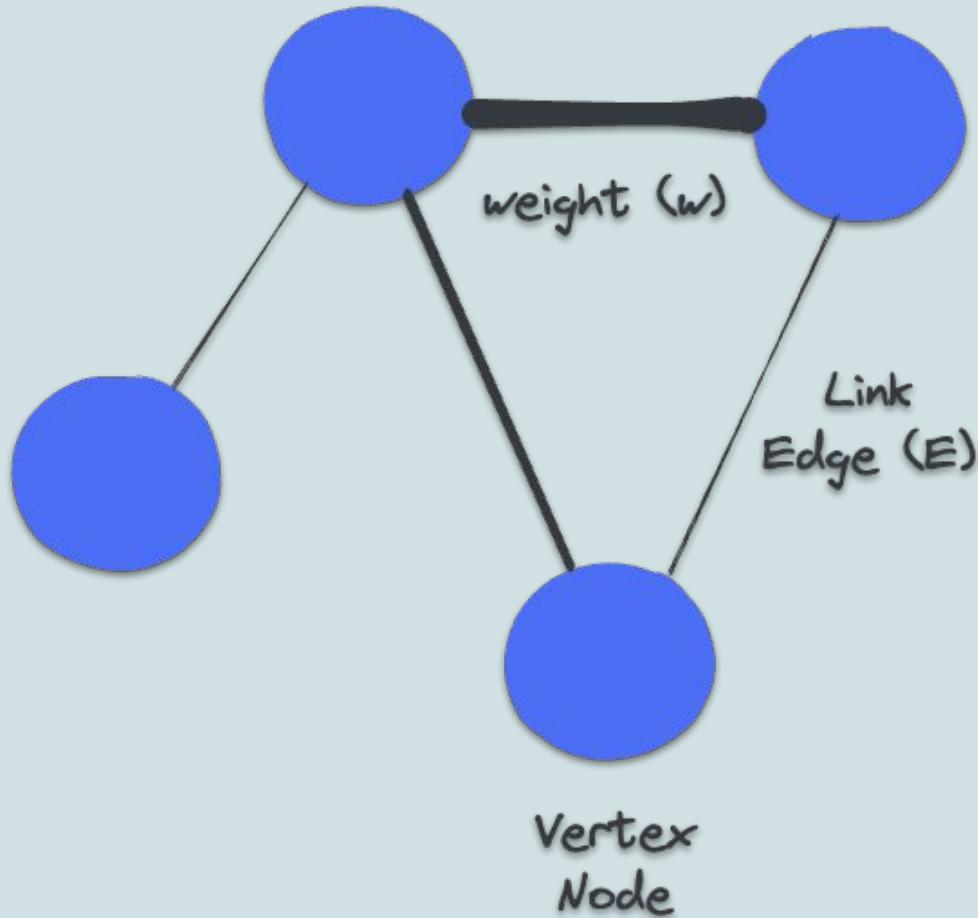
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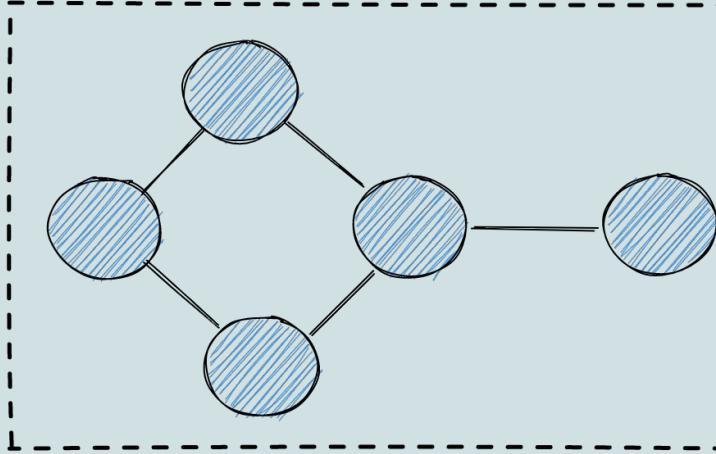
Basic Definitions

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

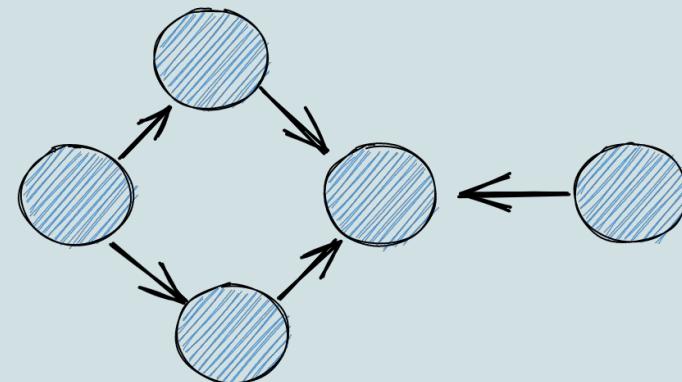
$$E \subseteq V \times V$$

$$W \subseteq R^+$$

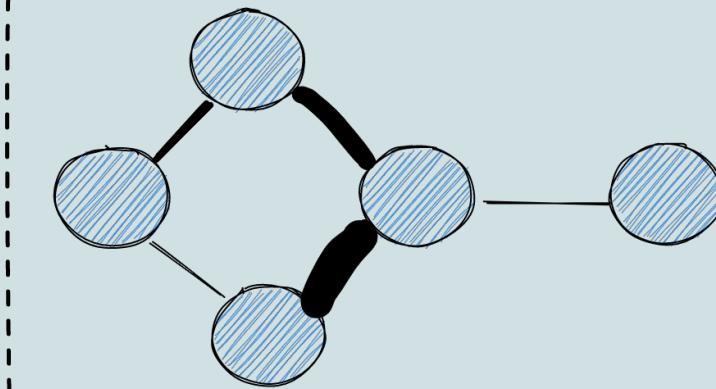
Undirected



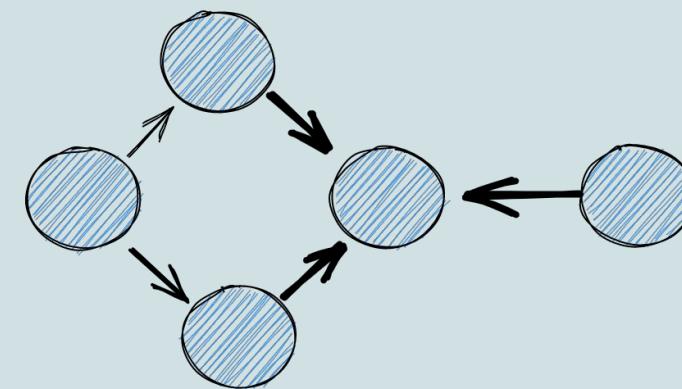
Directed



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.

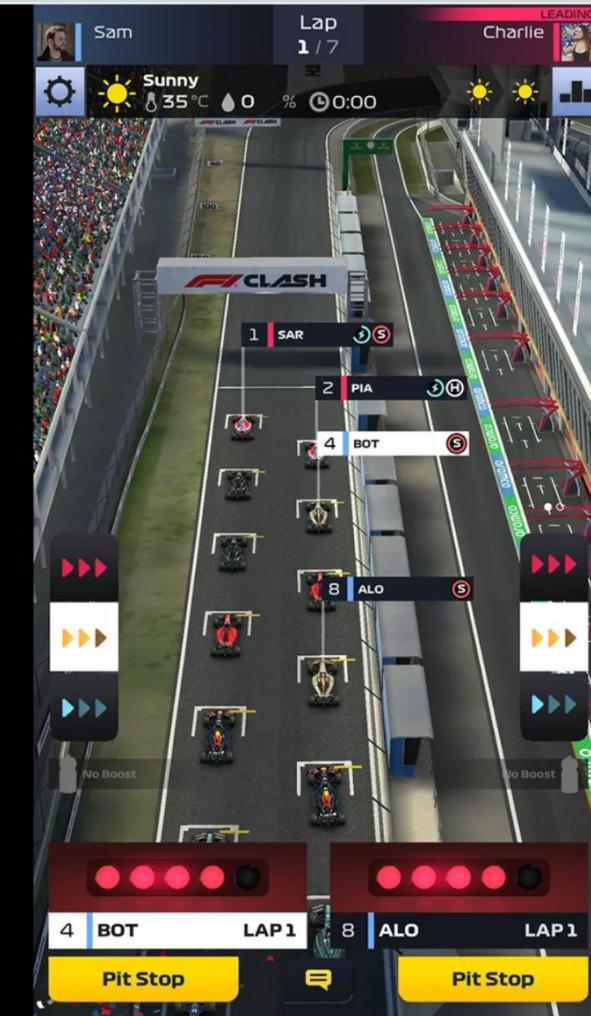
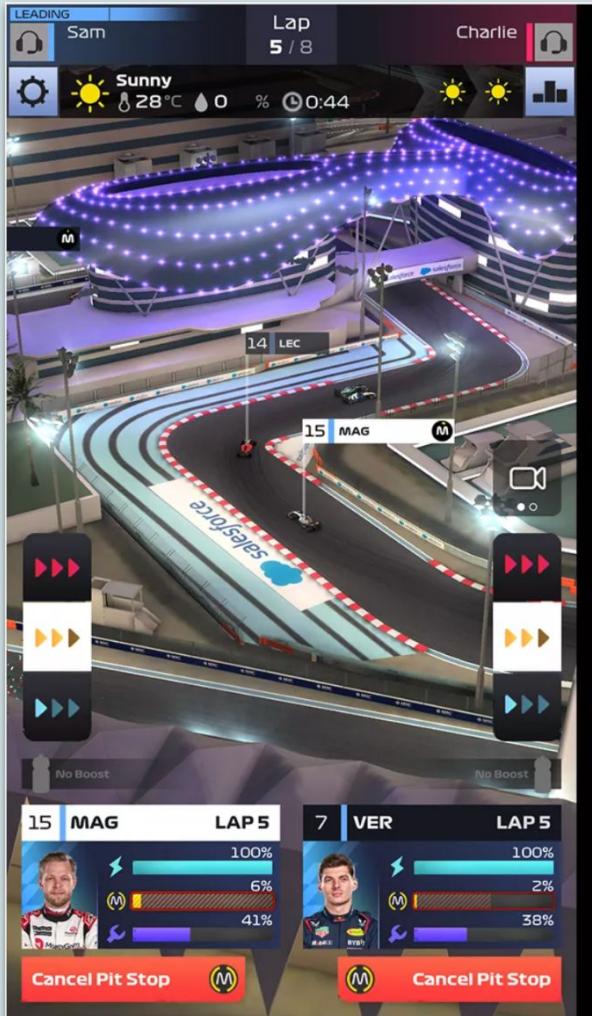
Involves real-life situations

Experiencing

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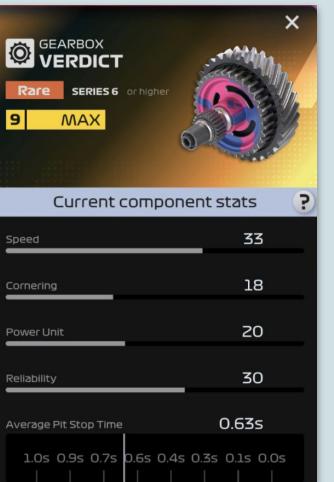
Configuring a setup

$\min(1,220)$

Breaks



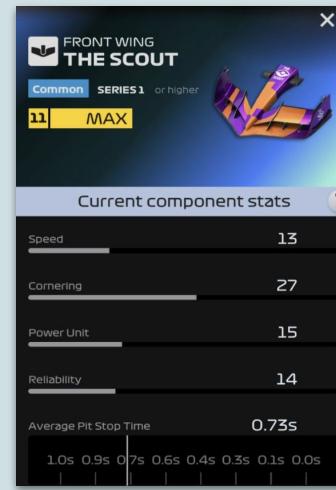
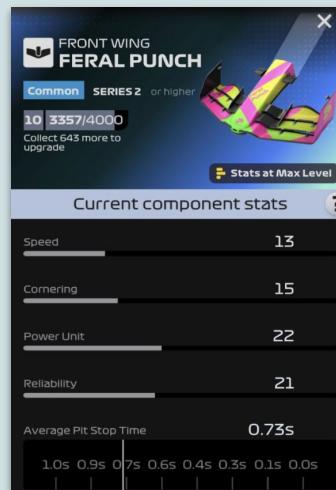
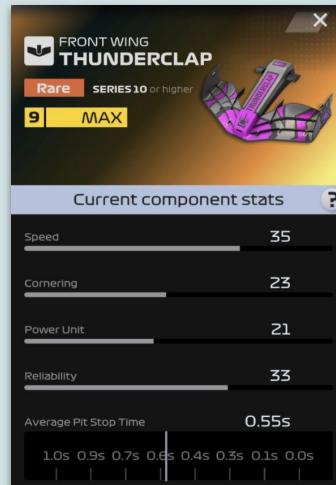
GearBox



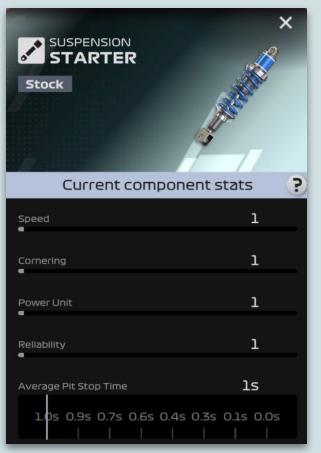
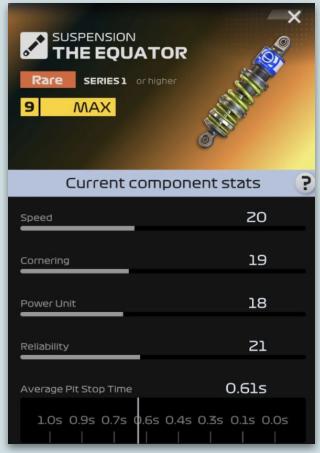
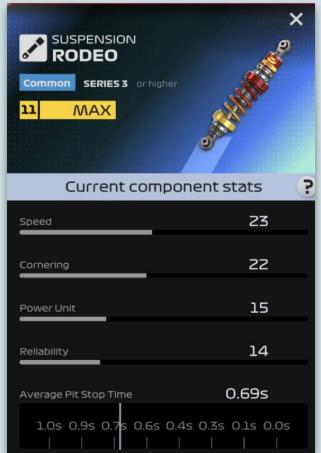
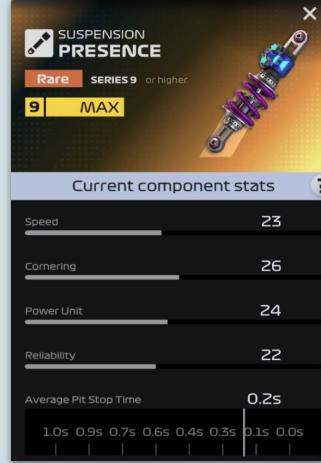
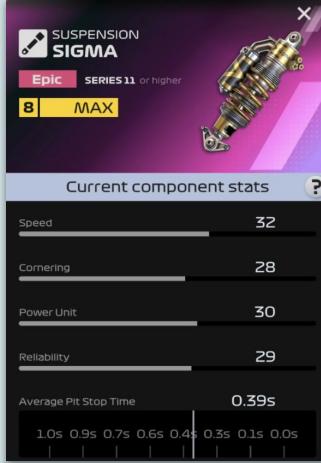
Rear wing



Front wing

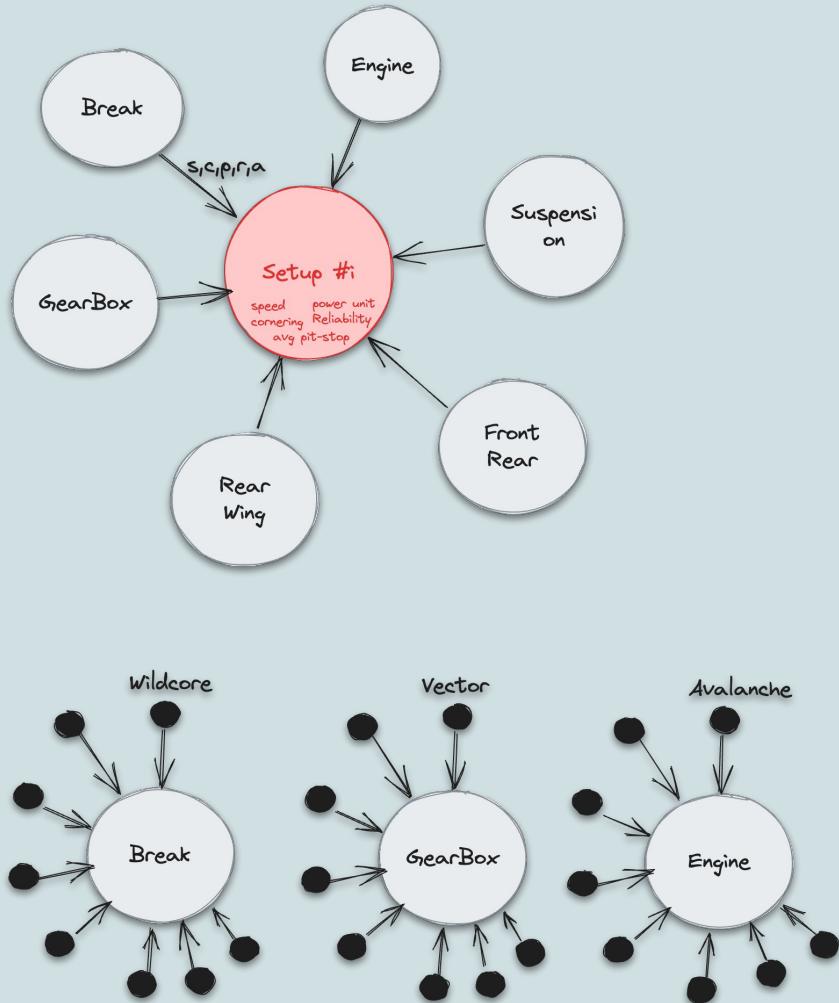


Suspension



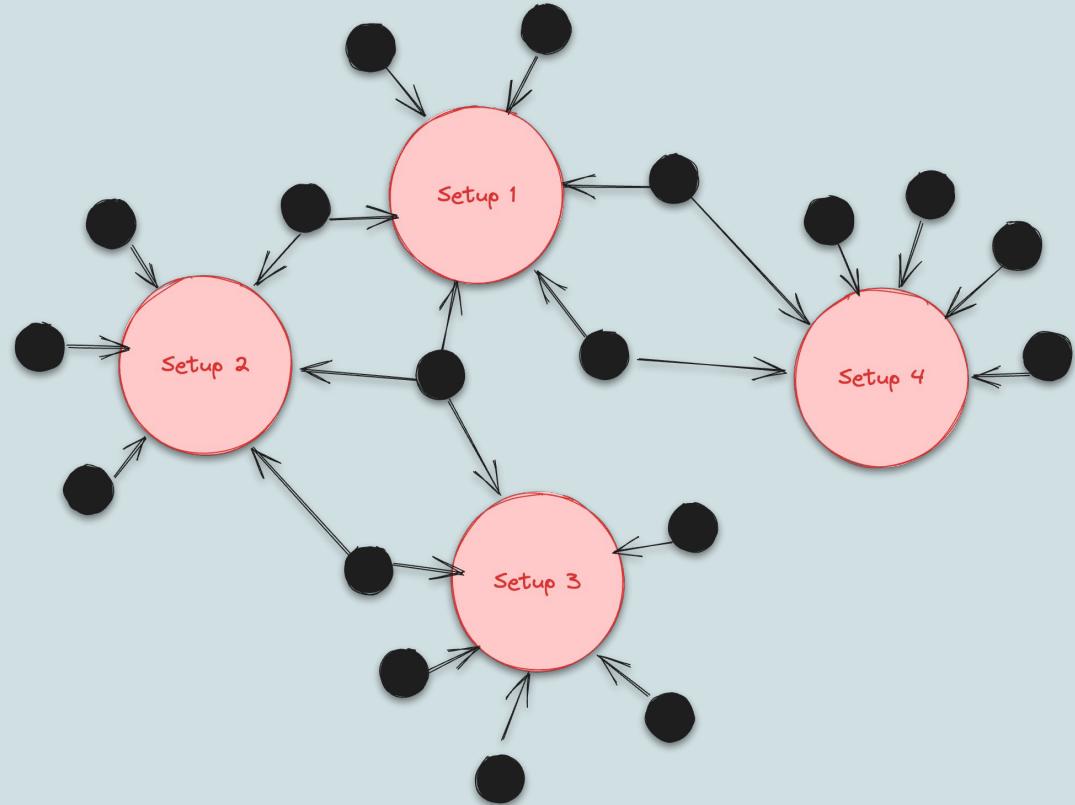
Engine



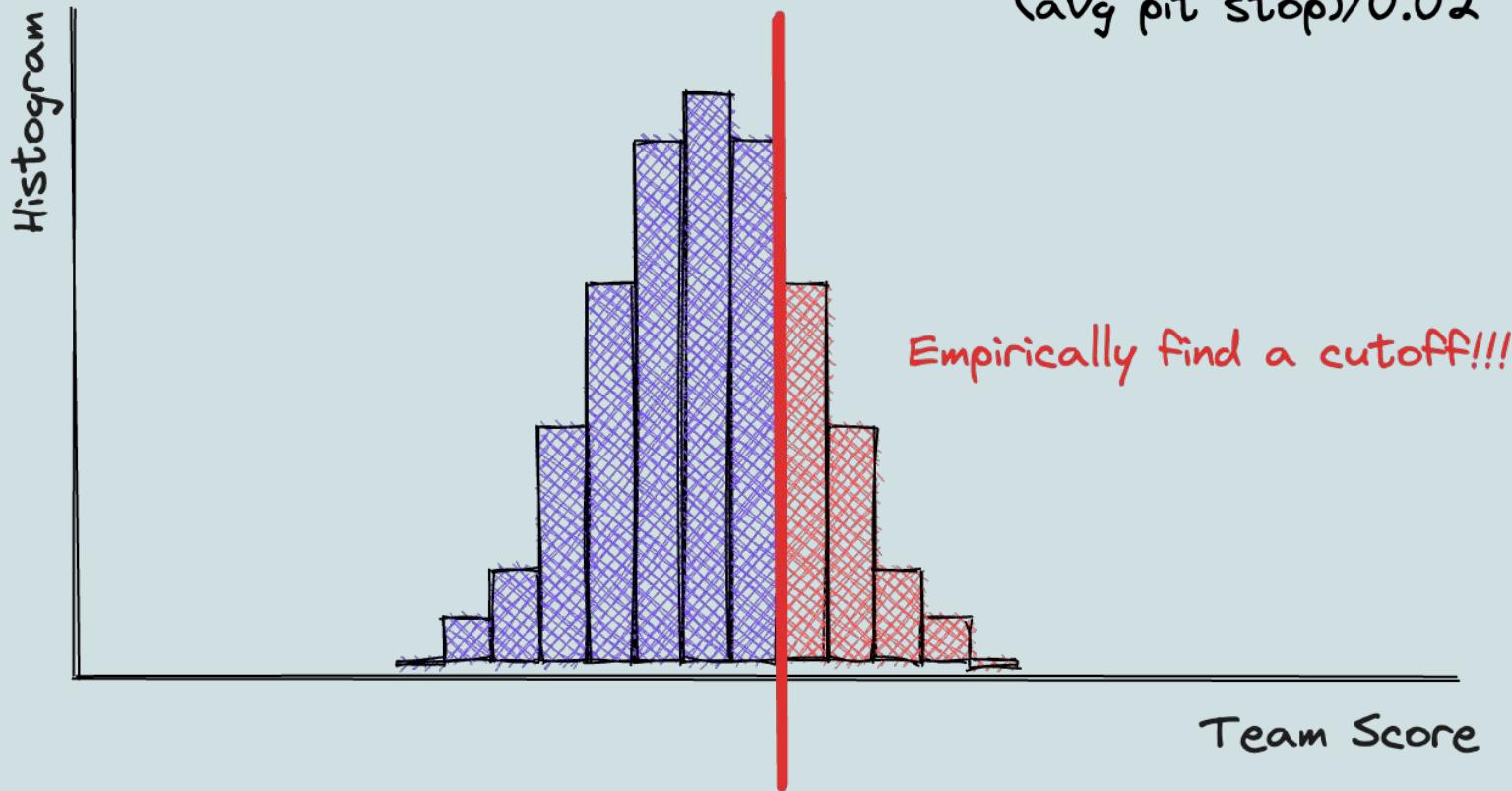




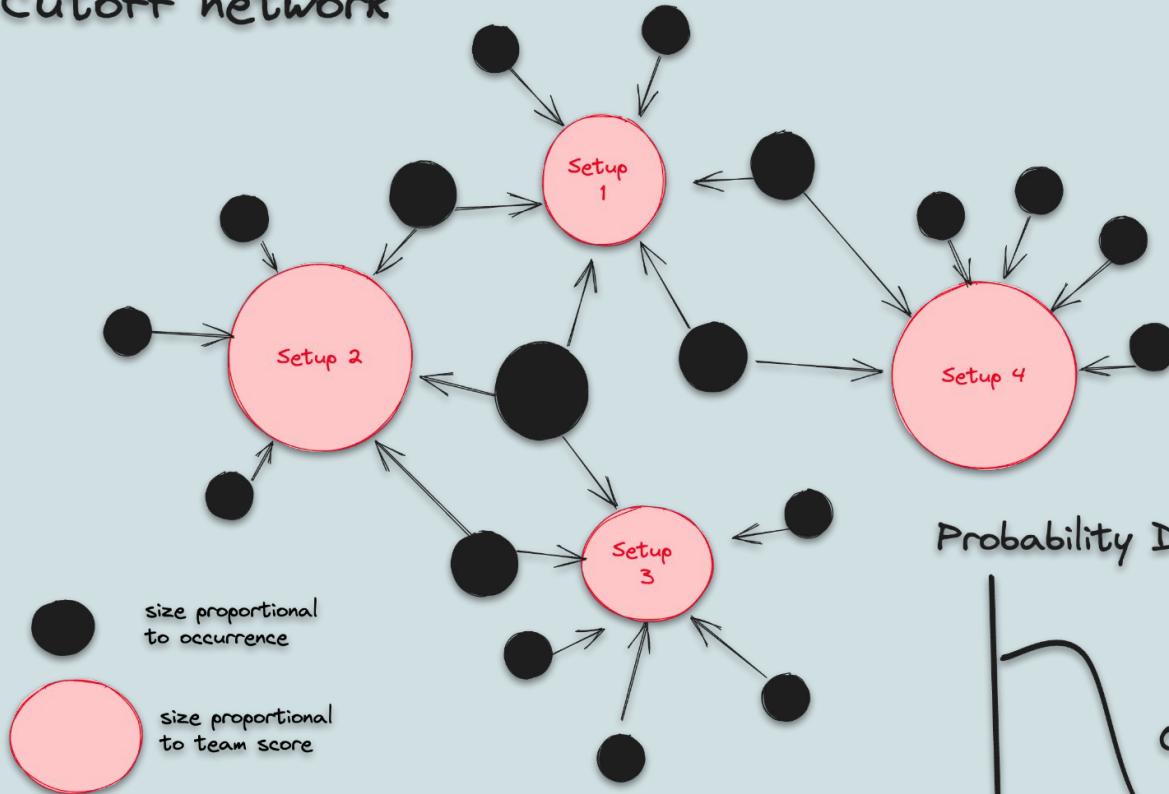
$8^6 = 262,144$
combinations



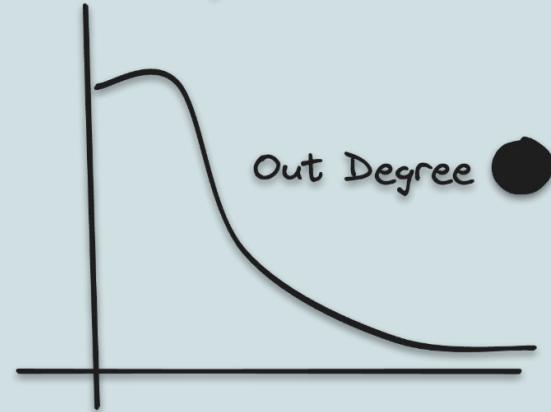
Team Score = speed + cornering + power unit + reliability +
(avg pit stop)/0.02

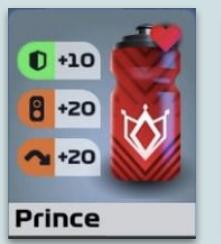
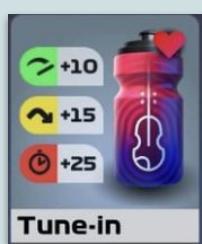
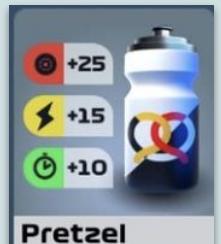


Cutoff network



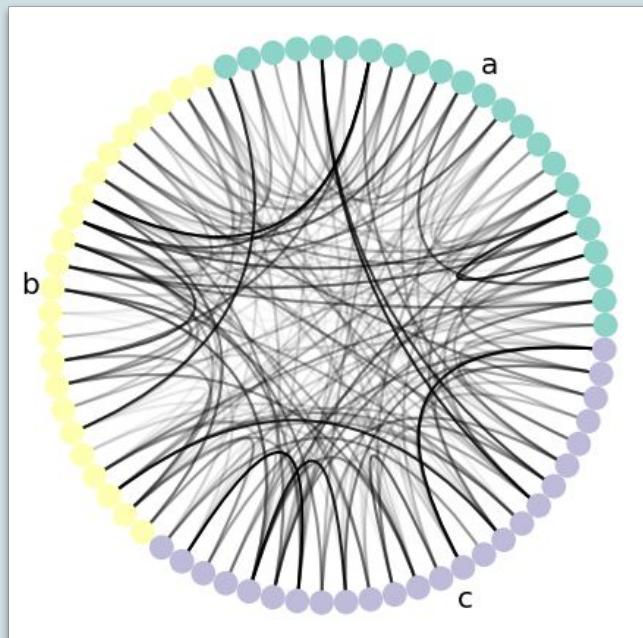
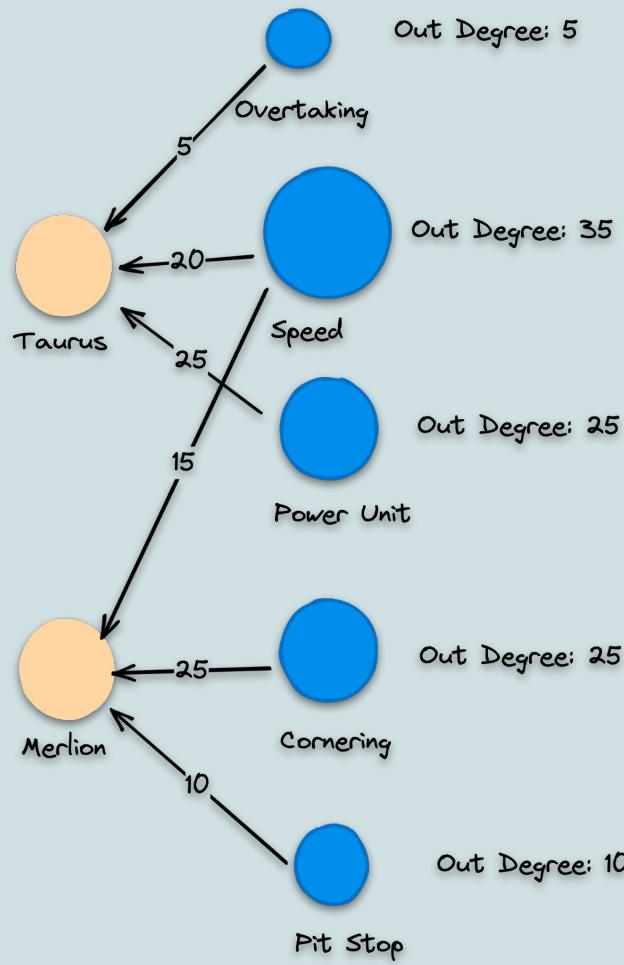
Probability Distribution Function (PDF)







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



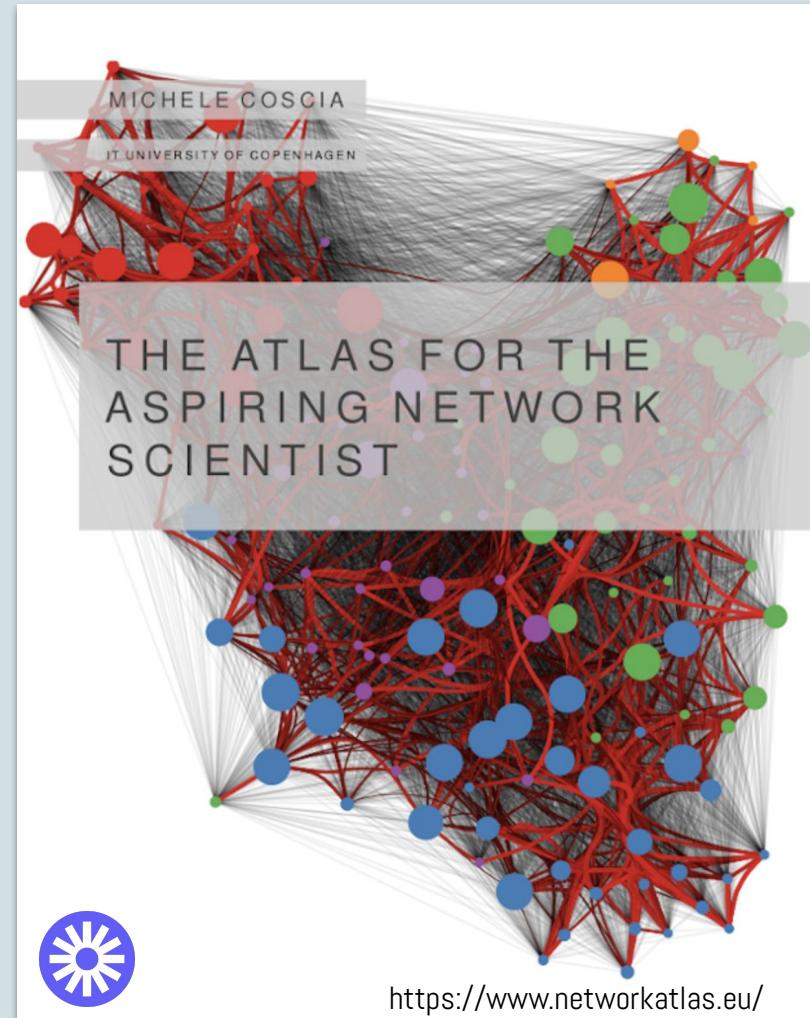


$$\min(\lceil \times 1, 99 \rceil)$$

Further Reading



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- Additional benefits from Python include fast prototyping, easy to teach, and multi-platform

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