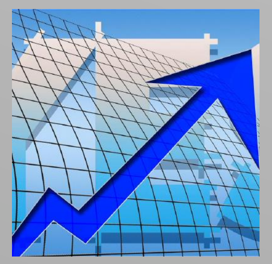
Hyperparameter Tuning for the *RouteNet* Model



Gradient Ascent

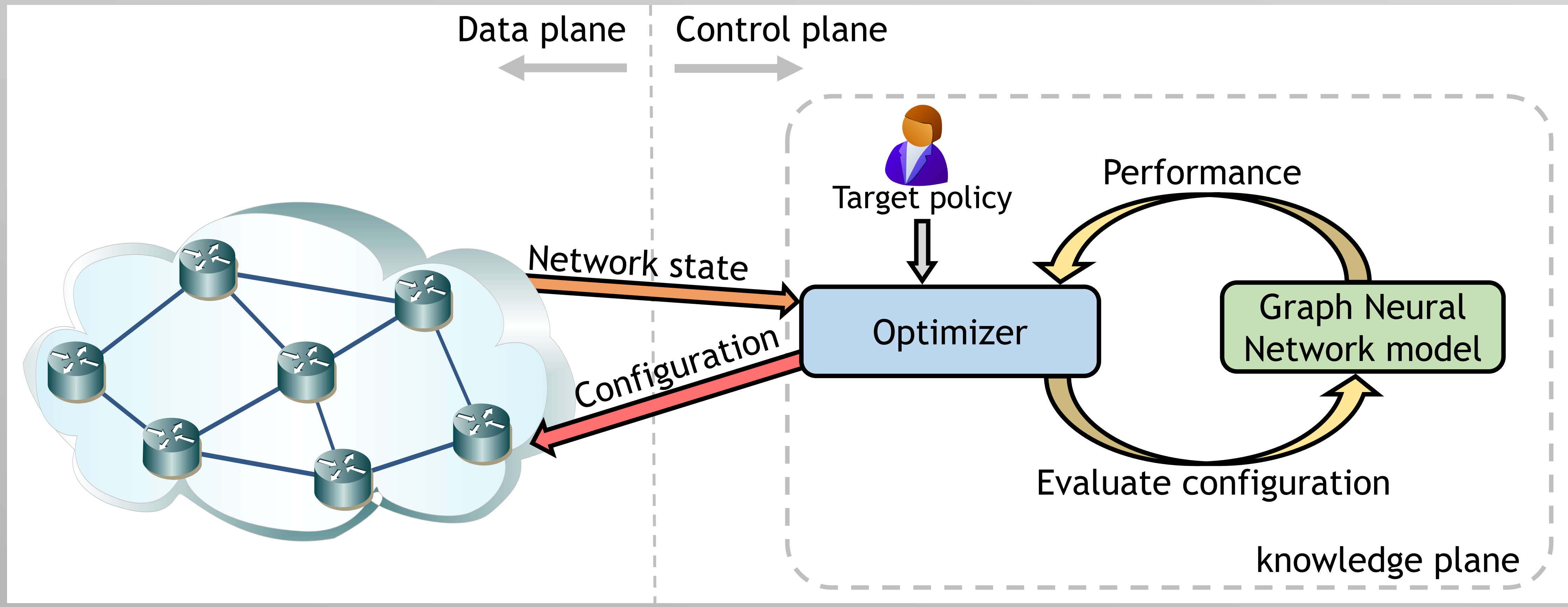
December, 16 2020
Nick Vincent Hainke, Stefan Venz, Johannes Wegener, Henrike Wissing

Fraunhofer
HHI

Motivation : ML-based QoS/QoE Optimisation

- Future Networks increasingly complex due to scale, heterogeneity, density, dynamics, …..
- Analytical models / heuristics no longer adequate
- Predictive / prescriptive QoS schemes (*e.g.,what-if-scenarios*) based on AI / ML

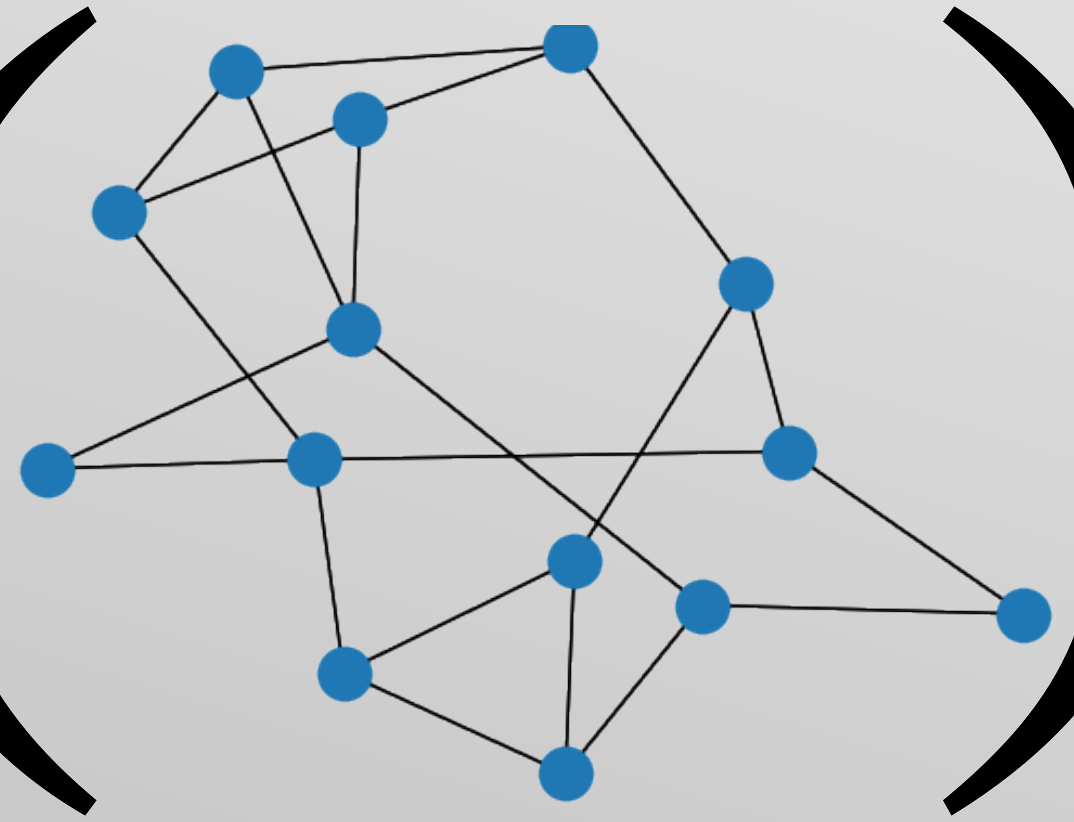
Telemetry



AI / ML

K. Rusek, J. Suárez-Varela, A. Mestres, P. Barlet-Ros, A. Cabellos-Aparicio
Proc. of the 2019 ACM Symposium on SDN Research (SOSR).

This Challenge: Predictive Analytics with GNN

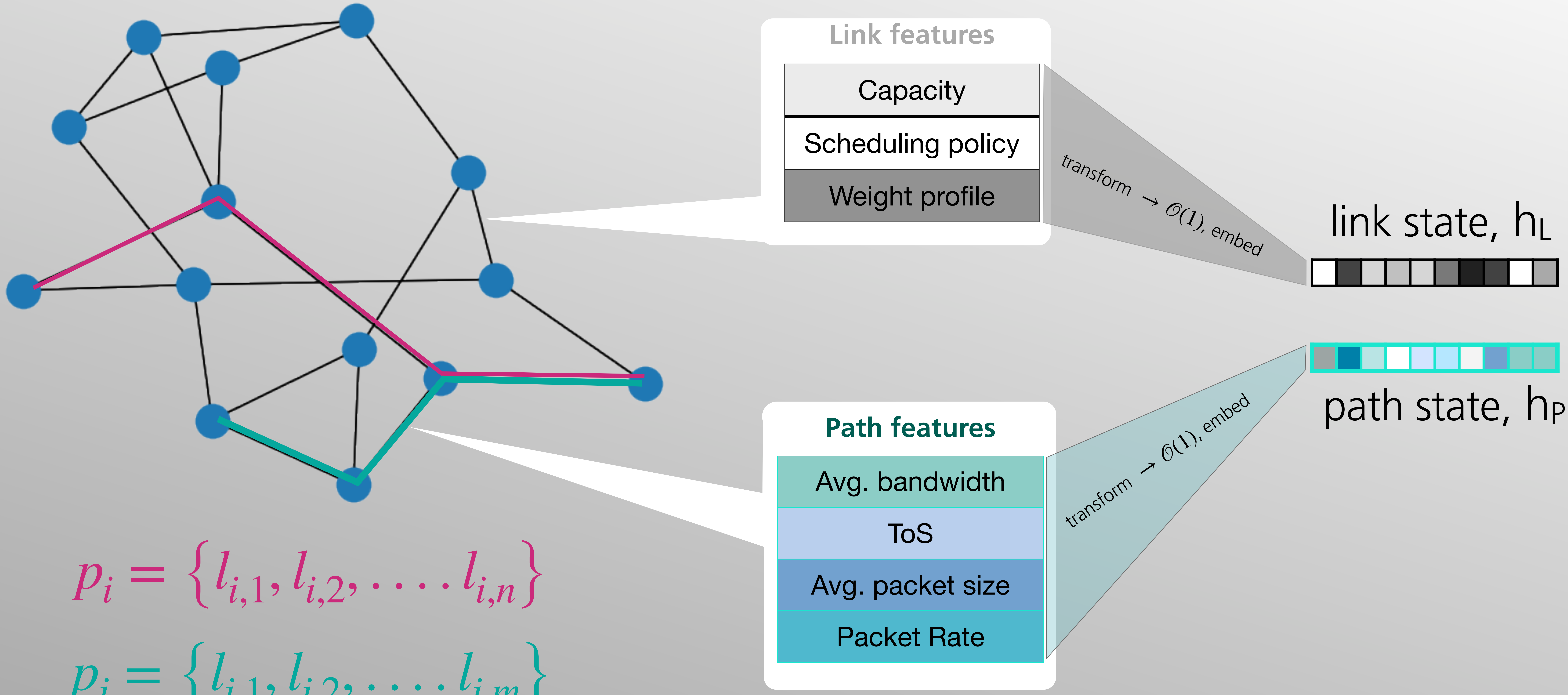
$f_\Theta($  $) = \vec{y}$

GNN
Target objective

Topology
Routing scheme
Traffic features
Link/Node features

Latency
Jitter
Throughput
Packet Loss

Network State



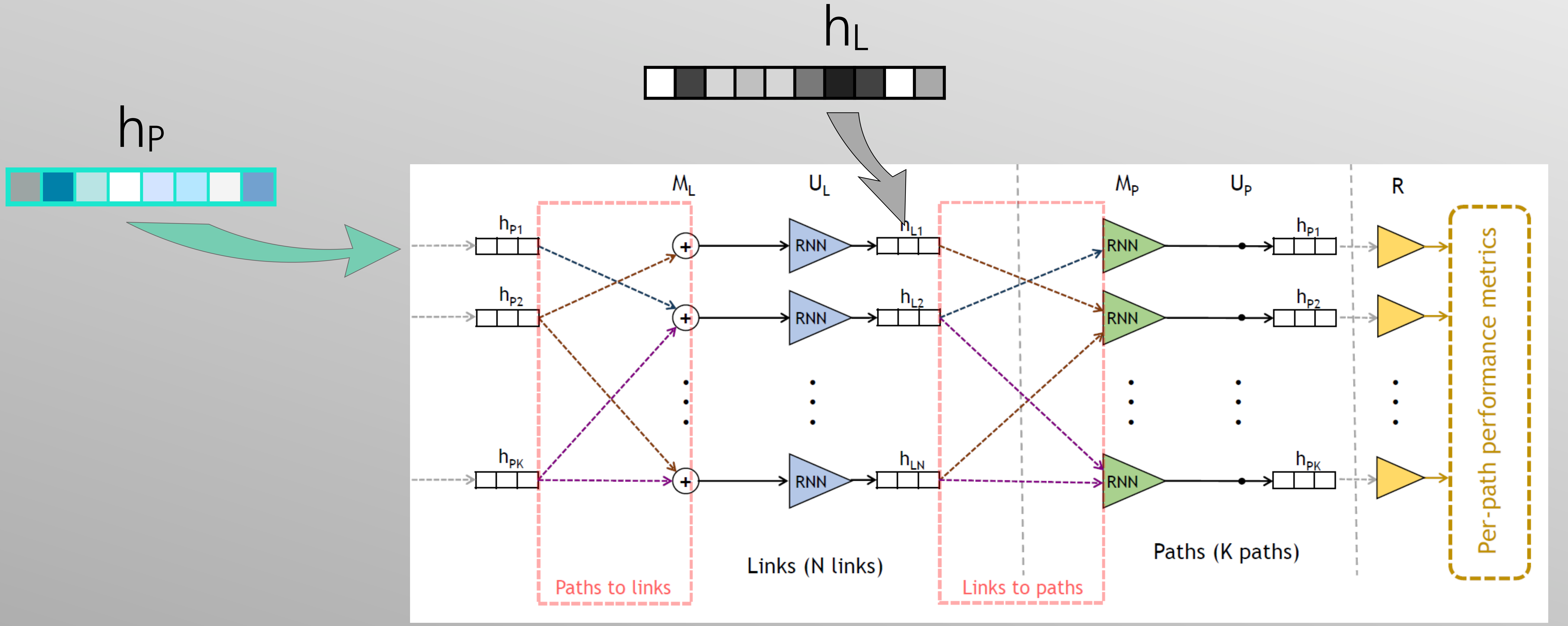
$$p_i = \{l_{i,1}, l_{i,2}, \ldots . l_{i,n}\}$$

$$p_j = \{l_{j,1}, l_{j,2}, \ldots . l_{j,m}\}$$

https://github.com/ITU-AI-ML-in-5G-Challenge/PS-014.2-GNN-Challenge-Gradient-Ascent

The RouteNet Model

K. Rusek, J. Suárez-Varela, A. Mestres, P. Barlet-Ros, A. Cabellos-Aparicio.
Unveiling the potential of Graph Neural Networks for network modeling and optimization in SDN
Proceedings of the 2019 ACM Symposium on SDN Research (SOSR), pp. 140-151, San Jose, USA, April 2019.



https://github.com/knowledgedefinednetworking/demo-routenet

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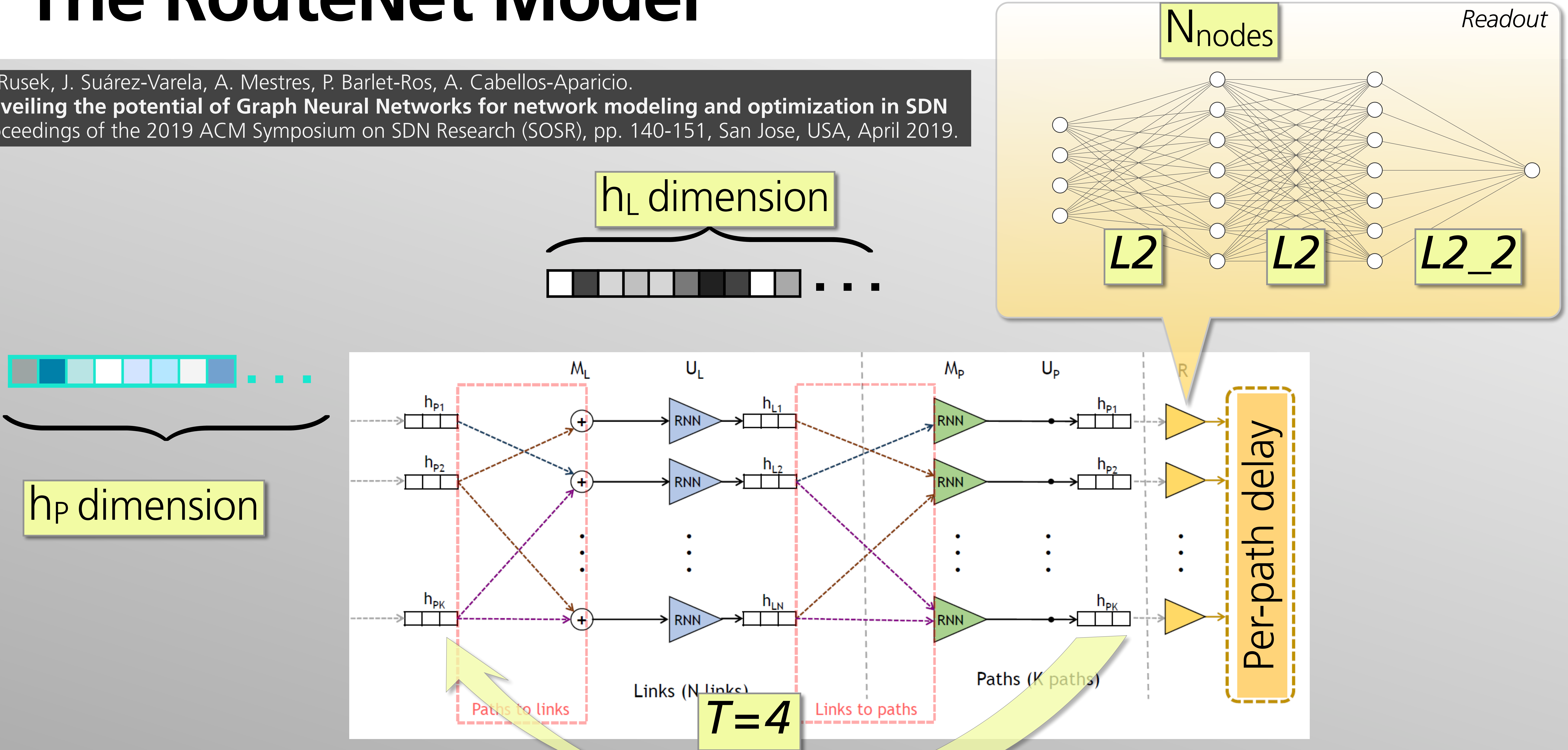

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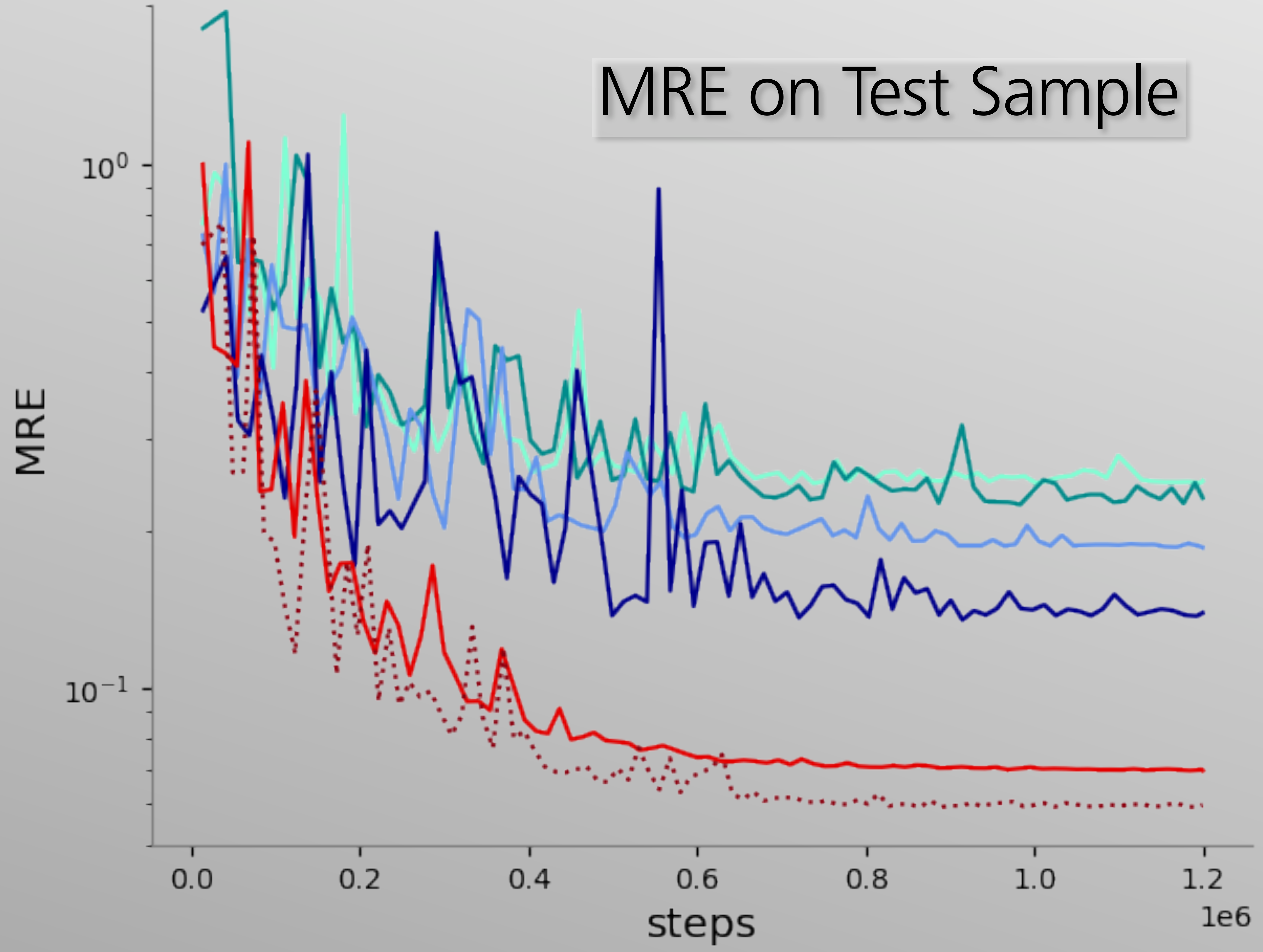
Hyperparameter Tuning



h_L dimension	h_P dimension	Readout N_{Nodes}	*Regularisation* *L2*	*Regularisation* *L2_2*
32	32	256	0.1	0.01
32	32	★512	0.1	0.01
★64	★64	512	0.1	0.01
★128	★128	512	0.1	0.01
128	128	512	★*N.A.*	0.01
★256	★256	512	*N.A.*	0.01

25 %	
22 %	
19 %	
12%	
7 %	Submitted solution
6 %	