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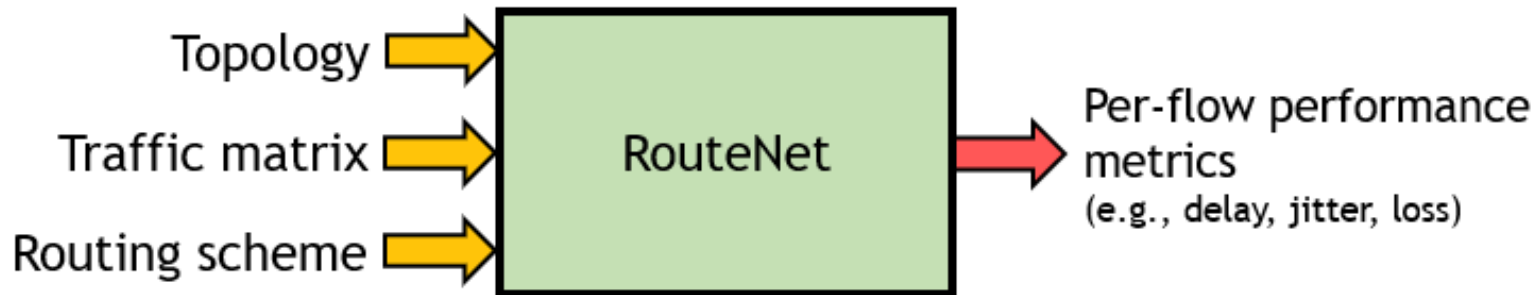
INTELLIGENT DATA ANALYTICS SALZBURG

A RouteNet Modification for Estimating Delays in Networks with Scheduling

Graph Neural Networking Challenge 2020

Martin Happ

Problem Setting



- Estimating average delays for paths in networks
- Topology: number of nodes, links can vary
- Traffic: bandwidth, link capacities
- Different Routing (same topology but different paths)

Image Source: <https://bnn.upc.edu/challenge2020/>

RouteNet Implementation

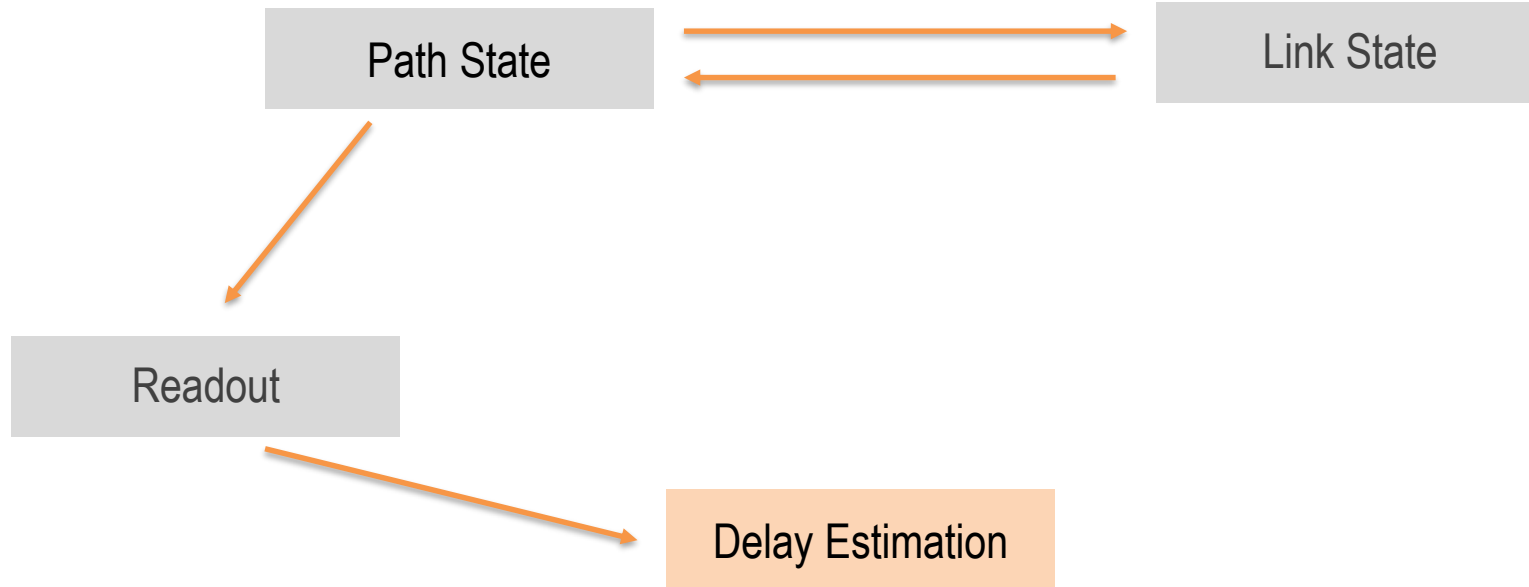
Original model (called RouteNet) by Rusek et al. (2019). Does not take scheduling into account. RouteNet is based on Graph Neural Networks.

Task of the challenge was to find either a new model or improve RouteNet to deal with scheduling in networks:

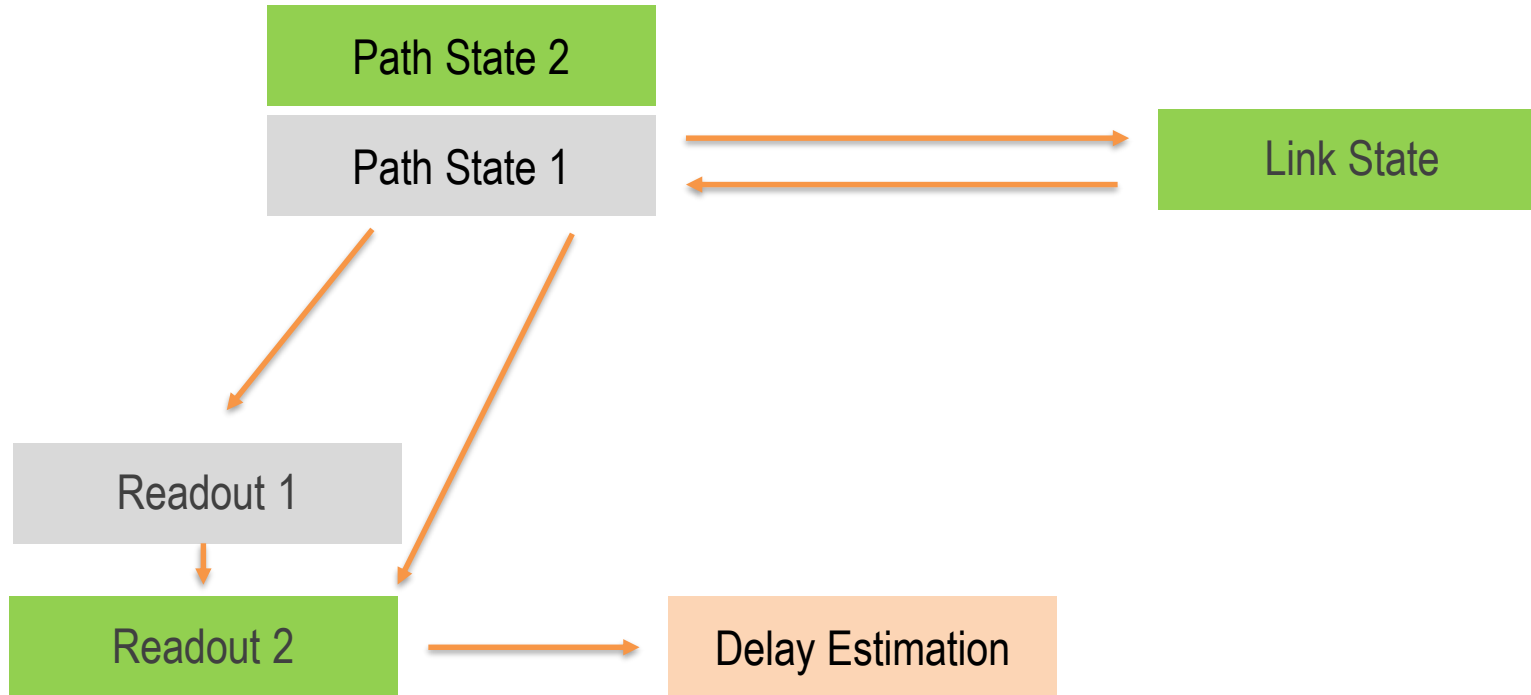
- SP
- WFQ
- DRR

3 different ToS with up to 5 weight profiles for WFQ and DRR.

RouteNet



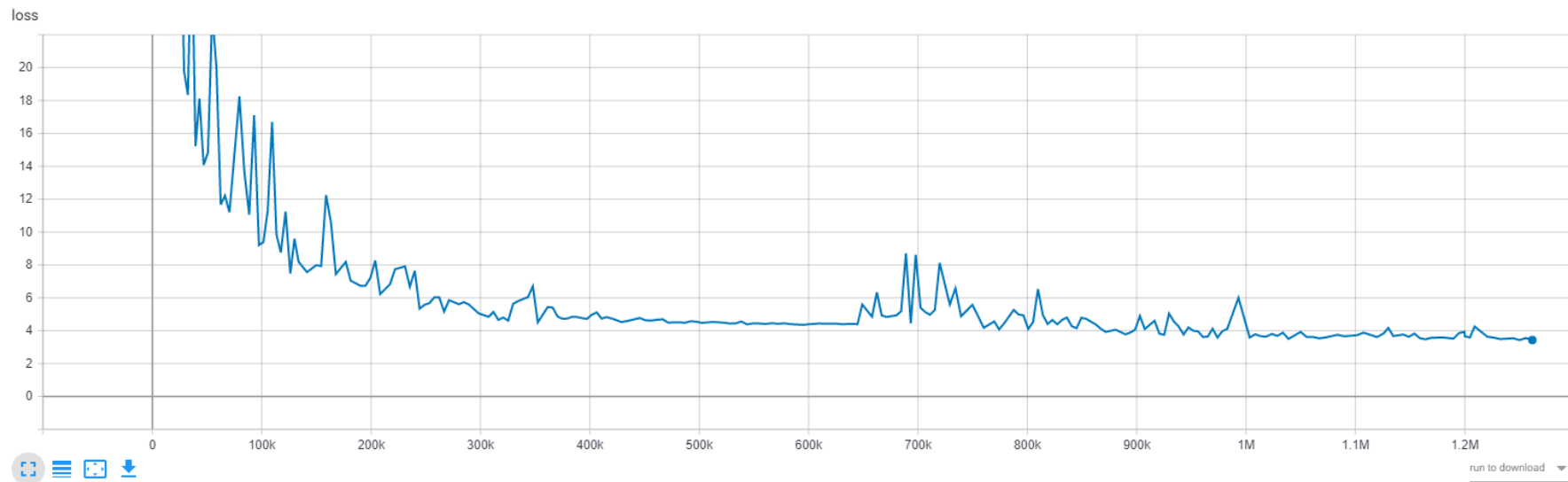
Modified RouteNet



Changes to RouteNet Architecture

- replacing link update RNN by a Feed-Forward NN
- adding n additional layer to the readout neural network (without activation function), path state as additional input (resembling residual neural networks)
- 2 stacked GRU cells for the path update RNN
- Adaptive learning rate: increase when there is a "loss plateau"

Mean Absolute Percentage Error



Further Comments

- Due to time constraints, our model is not optimal.
- Model can be easily improved. Our best model has currently an absolute percentage error of about 1.2%. In the challenge 1.9%.
- Training was done on a Geforce RTX 2080 Ti for about 48 hours.



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Thank you for your attention!

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