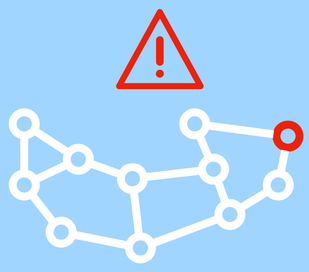
Net2Text

Hey network, what are you up to?*

Rüdiger Birkner, Dana Drachsler-Cohen, Laurent Vanbever, Martin Vechev

ETH Zürich

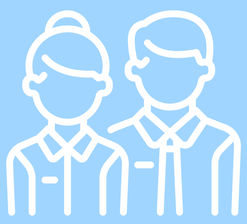
net2text.ethz.ch



Hey network,
the egress in NEWY is close to its maximum capacity.

Where is all that traffic coming from?

The traffic mostly enters in PHIL and goes to Youtube.



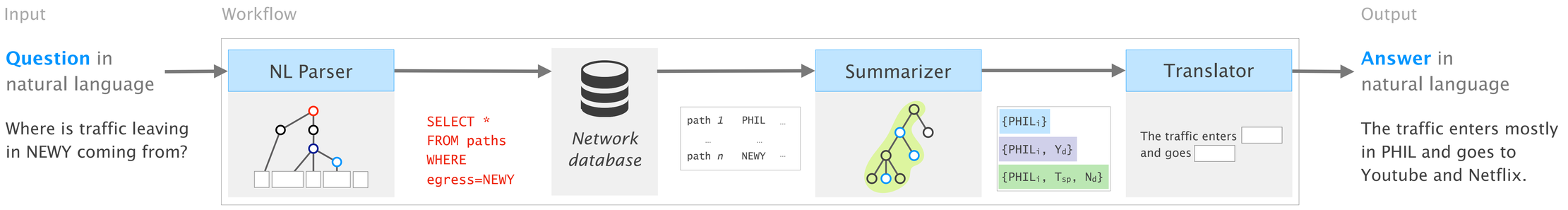
Understanding how the network behaves can take hours

- Wealth of low-level data from different sources
- Need to summarize this data and find high-level insights
- Networks get more and more complex

Net2Text assists network operators by answering their questions, in English

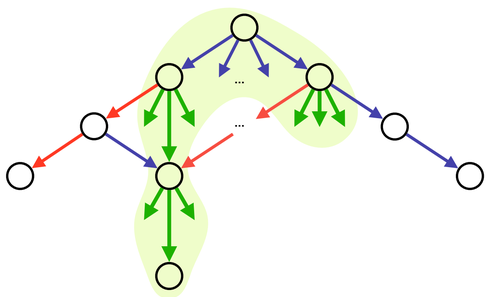
- It takes on the tedious, time-consuming tasks
- It provides succinct answers to the operator's questions
- It allows the operator to focus on managing the network

Net2Text creates *insightful* summaries in four steps: parsing, data retrieval, summarization, translation



Finding a meaningful summary is hard: Net2Text scales using both *approximation* and *sampling*

Approximating the best summary by reducing the search space



- Net2Text represents the search space as a graph
- Net2Text greedily explores the resulting graph
- Net2Text provably produces high-quality summaries

Reducing the input data by sampling

	prefix	dest.	egress	…	avg. bw
path 1	8.8.8.0/24	Google	NEWY	…	98.4 Mbps
~~path 2~~	~~46.14.0.0/16~~	~~Swisscom~~	~~NEWY~~	~~…~~	~~0.4 Mbps~~
path 3	81.63.0.0/17	Swisscom	NEWY	…	25.0 Mbps
…	…	…	…		…
~~path n~~	~~8.8.178.0/24~~	~~Yahoo~~	~~HOUS~~	~~…~~	~~1.0 Mbps~~

- Network traffic is highly skewed: repetitive and redundant
- High-level summaries are resilient to loss of redundant information

Net2Text answers within seconds

Perfomance

We tested on networks with > 100 routers

- Thanks to sampling, Net2Text answers within a couple of seconds
- Sampling affects the summary quality only at high sampling rates

Usability

We interviewed multiple network operators

- Virtual assistants add value wherever they speed up daily tasks
- Natural language interface was well-perceived
- Supported questions are relevant

(*) Rüdiger Birkner, Dana Drachsler-Cohen, Laurent Vanbever, Martin Vechev
Net2Text: Query-Guided Summarization of Network Forwarding Behaviors, *USENIX NSDI '18*, Renton, WA, USA.

ETH zürich