

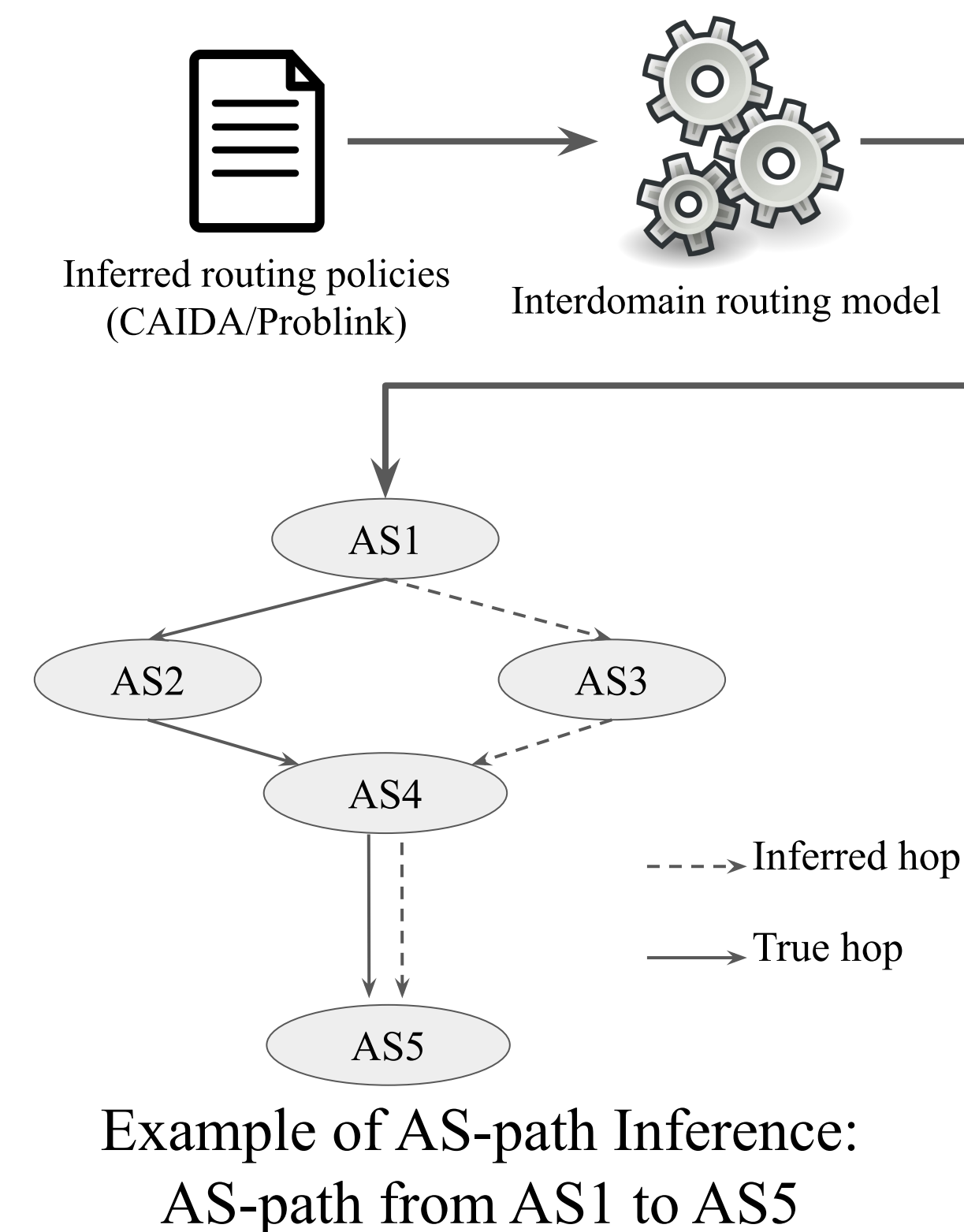
Understanding the Confounding Factors of Inter-domain Routing Modeling

Savvas Kastanakis Vasileios Giotsas Neeraj Suri
Lancaster University



Motivation & Background

- Internet inter-domain paths depend largely on contractual relationships between Autonomous Systems (ASes).
- AS relationships and the derived routing policies are often kept secret.
- Despite ~20 years of research, the state-of-the-art in AS-path prediction is highly error-prone!
- The widely accepted model for Internet routing (Gao-Rexford) is overly simplistic for path prediction!



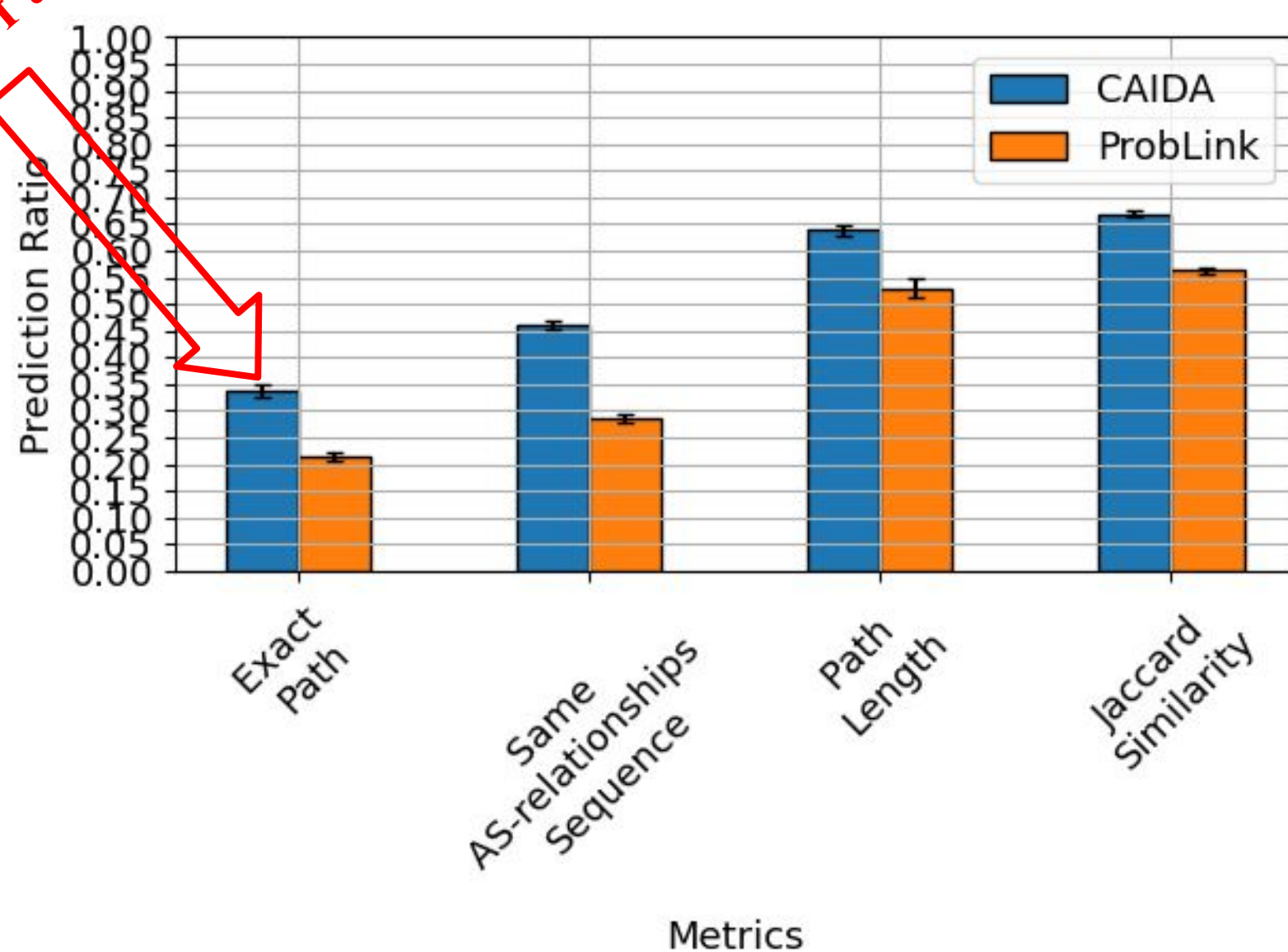
We need to understand the pitfalls of the inference process and improve it:

RQ1: What are the confounding factors that affect interdomain routing modeling?

RQ2: What is their contribution to the inference error?

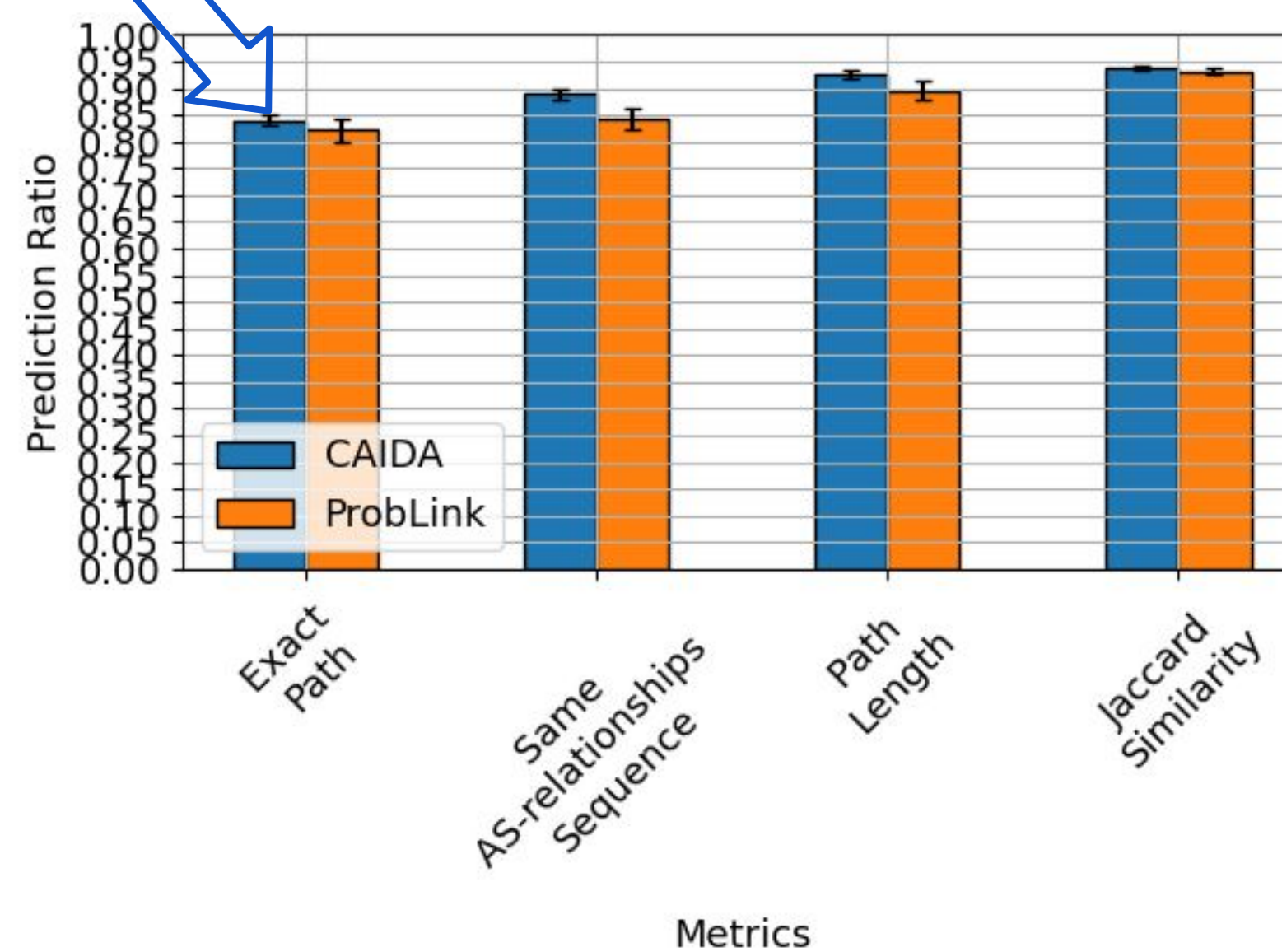
First-hop agnostic inference

We can infer AS-paths correctly 1/3 of the times



2.5x increase in accuracy when first-hop is known

First-hop aware inference



Researchers want to study new protocols or the resilience of security solutions under specific attacks!

ISPs want to capture the potential impact of routing policy changes before reconfiguring operational routes!

Confounding Factors

We should take geolocation into consideration in simulations!

	CAIDA	ProbLink
Exact Path Match	84.1 %	82.1 %
Missing AS relationships	0.95 %	0.53 %
Unconventional routing policies	4.36 %	1.32 %
Local-pref violations	7.86 %	11.42 %
Shortest path not available	2.93 %	3.62 %
Geo-specific routing policies	8.54 %	10.31 %

Errors originate from: oversimplified model, missing input, but mostly because of the geolocation agnostic prediction process!