

White Mirror

Leaking Sensitive Information from Interactive Netflix Movies using Encrypted Traffic Analysis

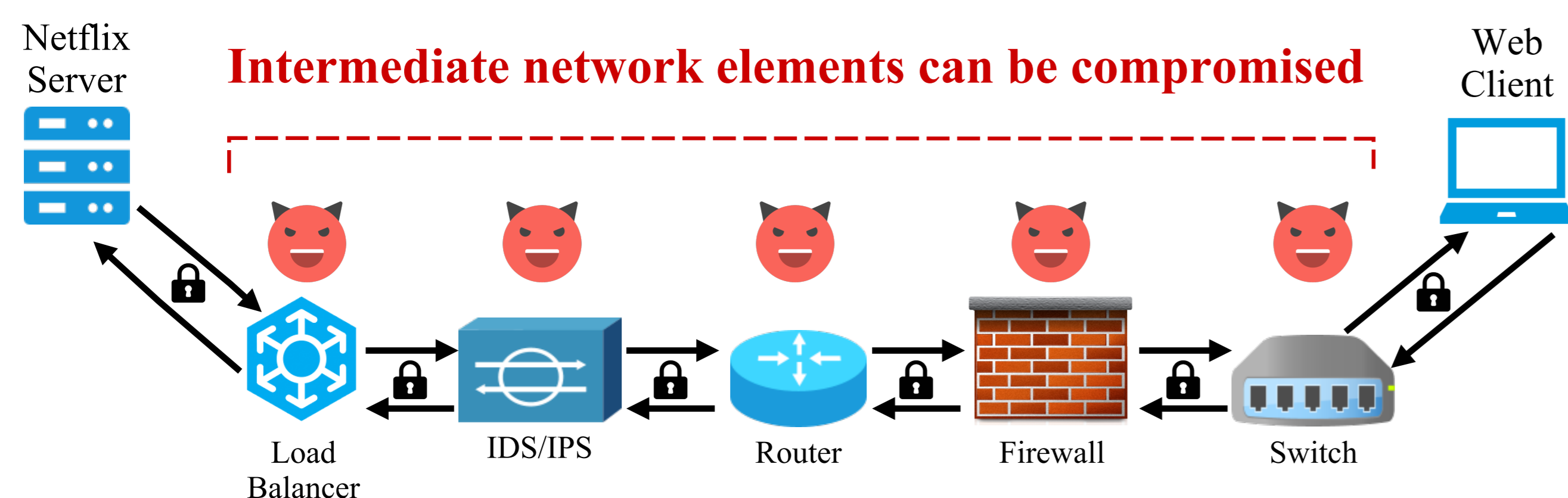
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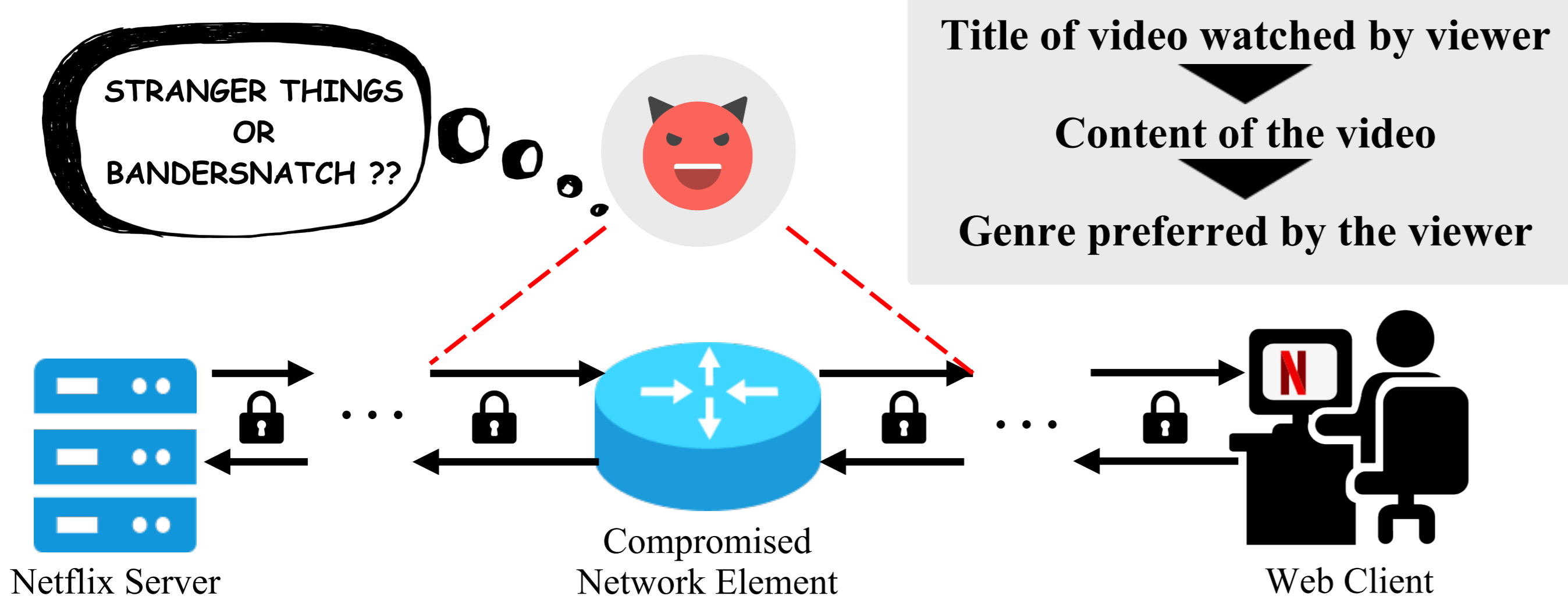
1. Problem Statement



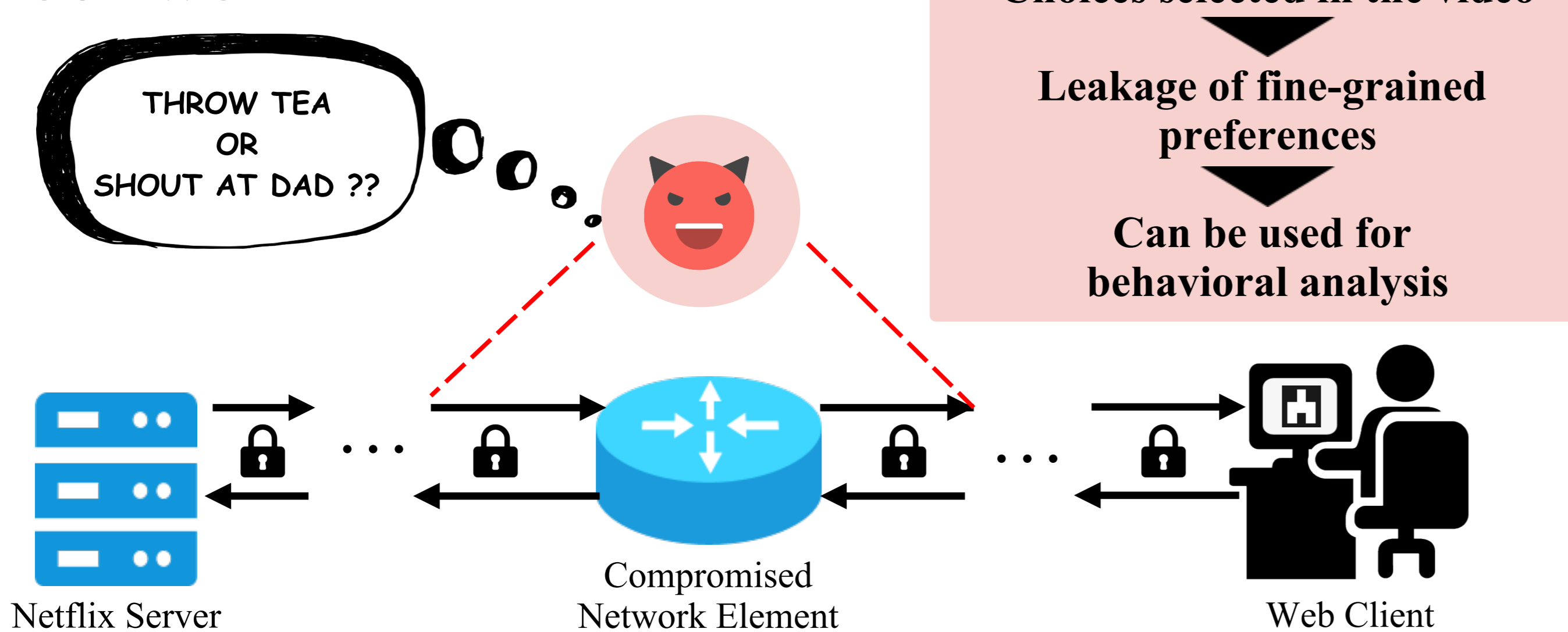
Do interactive movies on Netflix leak *fine-grained* information about the viewers to passive eavesdroppers even when encrypted?

2. Comparison with Existing Works

EXISTING WORKS



OUR WORK



3. Challenge

Inter-video features (e.g., video bitrate) cannot be used to differentiate between segments from the same video.

4. Our Contributions

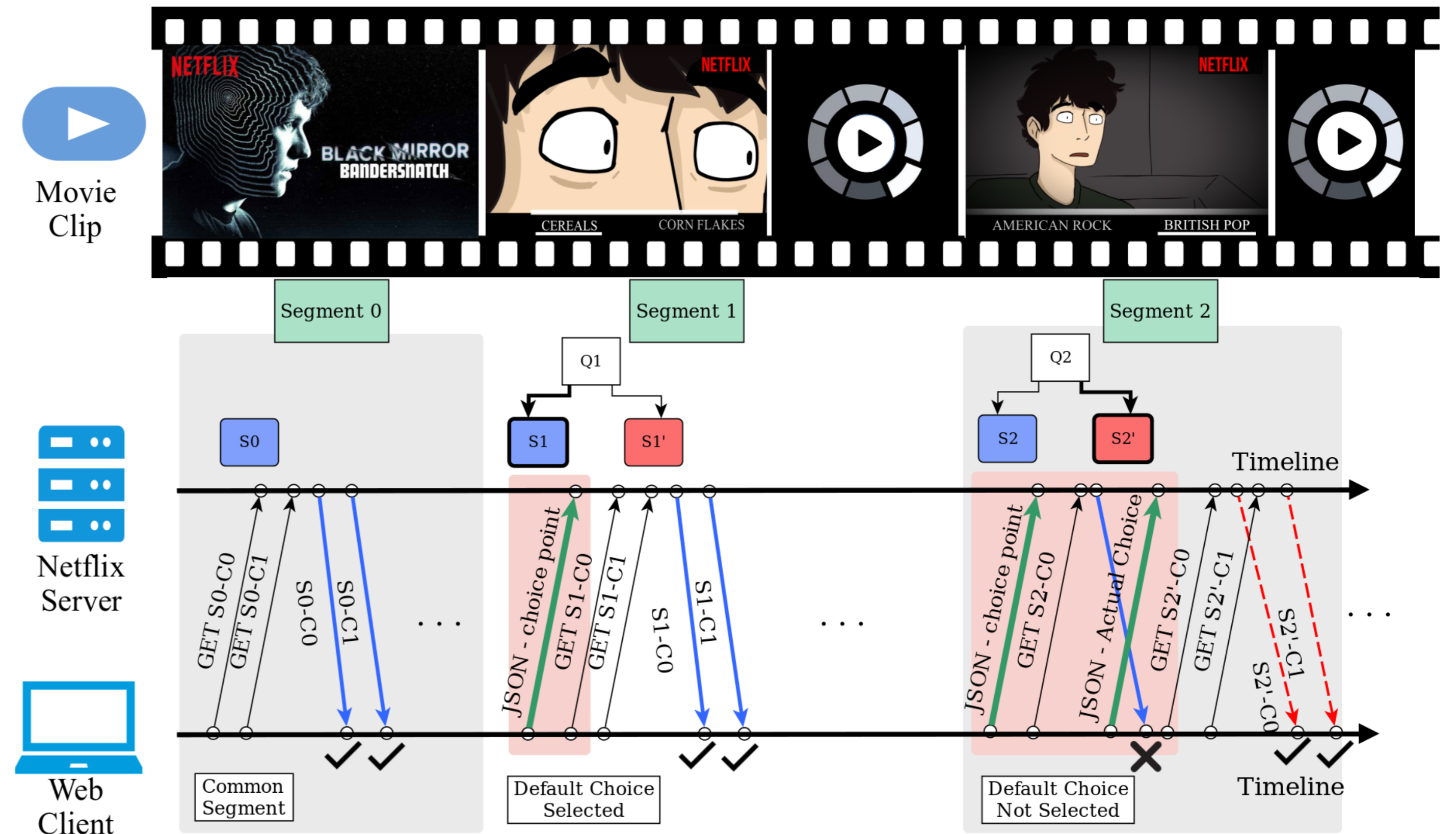
1. We present the *first traffic analysis technique for interactive videos* that can leak more information than non-interactive videos.
2. We present the *first dataset* and *identify future directions* for encrypted traffic analysis on interactive videos.

Github link to Netflix interactive video traffic dataset:

<https://github.com/Gargi-Mitra/SIGCOMM2019-NetflixInteractive.git>

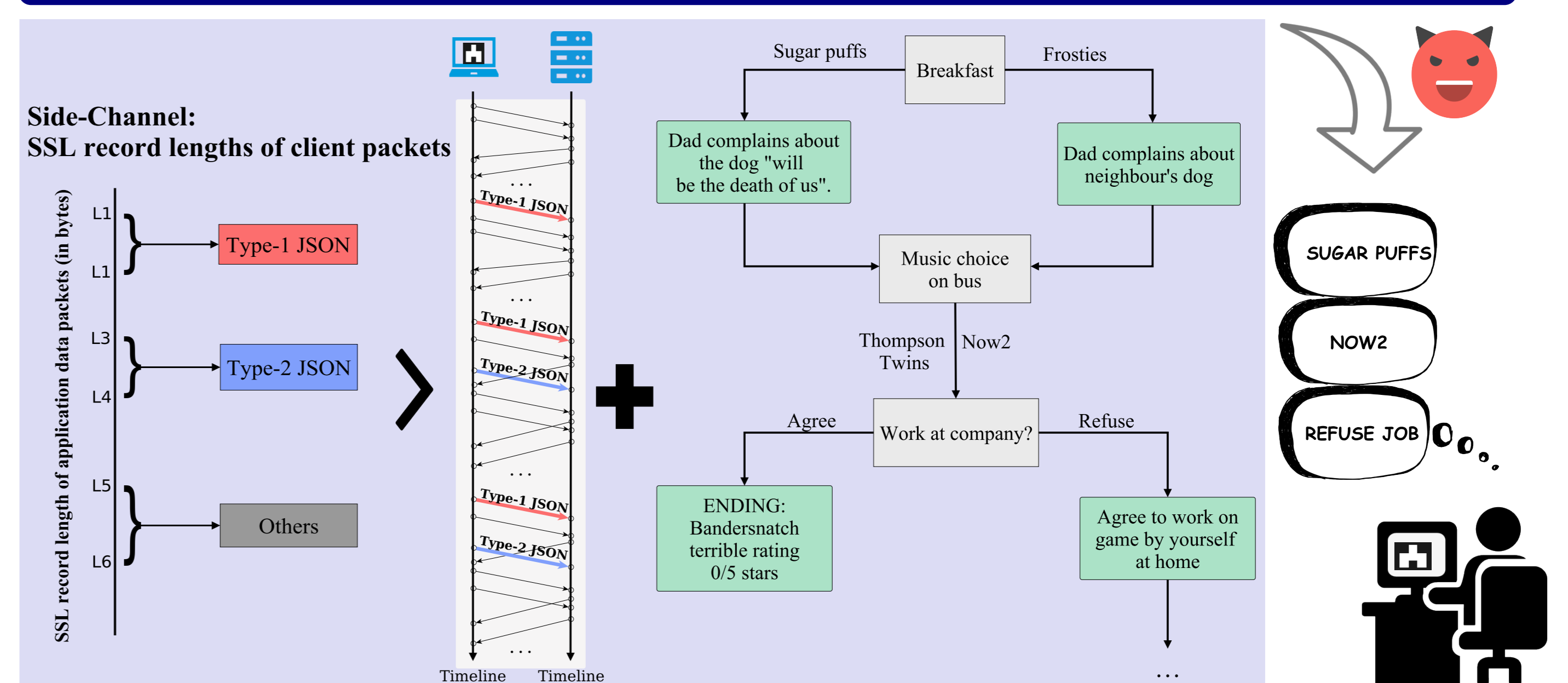
The primary author is a Ph.D. Student at IIT Madras, working in the area of Internet Security and Privacy.
Link to personal website: <http://cse.iitm.ac.in/~gargim/>

5. Traffic Pattern of Interactive Videos on Netflix *



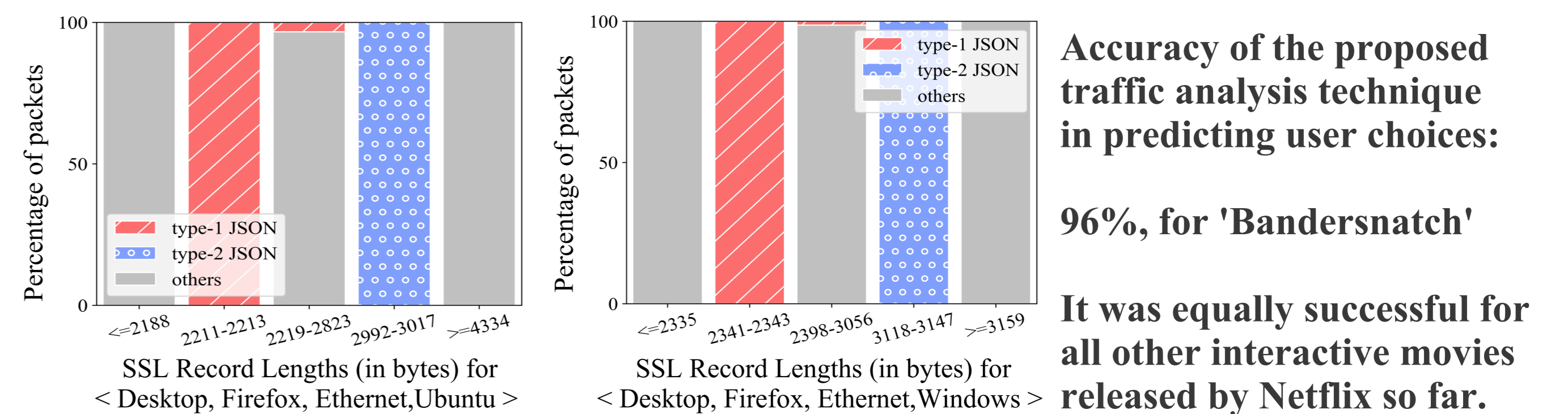
Can we identify the 2 types of JSON files from encrypted traffic?
Choice-point JSON : Type-1 JSON carrying actual choice: Type-2

6. Prediction of User Choices from Encrypted Traffic



7. Dataset and Results

Conditions	Attribute	Value
Operational	Operating System	Windows, Linux, Mac
	Platform	Desktop, Laptop
	Traffic Conditions	Morning, Noon and Night
	Connection Type	Wired, Wireless
	Browser	Google-chrome, Firefox
Behavioral	Age-group	<20, 20-25, 25-30, >30
	Gender	Male, Female, Undisclosed
	Political Alignment	Liberal, Centrist, Communist, Undisclosed
	State of Mind	Happy, Stressed, Sad, Undisclosed



8. Research Directions

1. Designing side-channel resistant techniques for transmitting user choices without compromising users' viewing experience
2. Developing an open source model of the interactive video control packet exchange for evaluating countermeasures

References

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- [3] Feng Li, Jae Won Chung, and Mark Claypool. Silhouette: Identifying youtube video flows from encrypted traffic. In *NOSSDAV*, pages 19–24. ACM, 2018.
- [4] Andrew Reed and Michael Kranch. Identifying https-protected netflix videos in real-time. In *CODASPY*, pages 361–368. ACM, 2017.
- [5] Roei Schuster, Vitaly Shmatikov, and Eran Tromer. Beauty and the burst: Remote identification of encrypted video streams. In *USENIX Security*, 2017.