taken for non-overlapping, two week periods because each places a significant burden on the subject networks. Trinocular's much lower traffic rate to targeted blocks (1% that of a survey) allows outage detection to overcome both of these limitations. As demonstrated in §7.1, it can operate concurrently from three sites. We plan to carry out continuous monitoring as Trinocular matures.

8. CONCLUSIONS

Trinocular is a significant advance in the ability to observe outages in the network edge. Our approach is principled, using a simple, outage-centric model of the Internet, populated from long-term observations, that learns the current status of the Internet with probes driven by Bayesian inference. We have shown that it is parsimonious, with each instance increasing the burden on target networks by less than 0.7%. It is also predictable and precise, detecting all outages lasting at least 11 minutes with durations within 330 s. It has been used to study 3.4M blocks for two days, and to re-analyze three years of existing data, providing a new approach and understanding of Internet reliability.

Data Availability and Acknowledgments: The raw and analyzed data from this paper are available at no cost to researchers through the U.S. DHS PREDICT program (`www.predict.org`) and by request from the authors [27]. This work was classified by USC's IRB as non-human subjects research (IIR00000975).

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