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Assessing the Anonymity Paradox: An Evaluation of Browser Fingerprint Uniqueness across Privacy Configurations

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Browser Fingerprinting is a tracking technique that is becoming more pervasive in today's online environment.
Some privacy enthusiasts attempt to counter this with the use of privacy focused browser features and also extensions.
It has been observed that in their attempts to increase privacy, sometimes they make their fingerprint more unique having the opposite effect.
This has become known by some as the anonymity paradox.

Research Questions

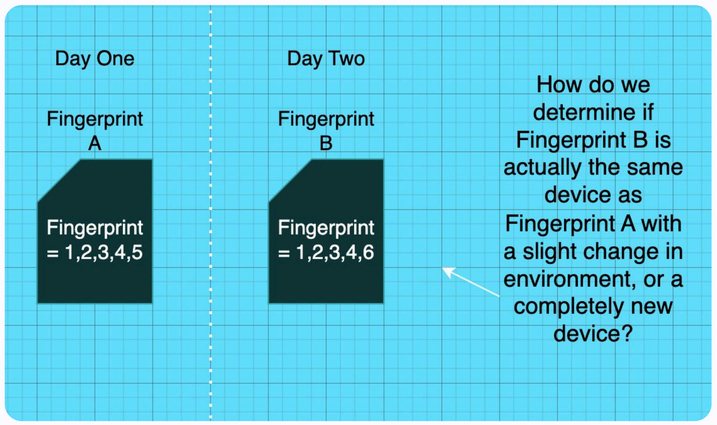
1. Do specific combinations of extensions more or less unique fingerprints compared to single extensions?
2. How unique are browser fingerprints that are generated by each chosen browser under default settings?
3. To what extent does repeated testing show consistent or differing fingerprints across configurations?

Lit Review Summary

Browser fingerprinting makes persistent tracking possible by collecting unique browser and device attributes, most users end up being uniquely identifiable. Common techniques include taking data from HTTP headers and rendering methods like Canvas or WebGL.
Privacy extensions aim to reduce tracking but the anonymity paradox suggests they can in some cases actually increase uniqueness.
Fingerprint uniqueness has been measured using Shannon entropy and research shows high identification potential despite available defences.

Methodology / Tools

Four virtual machines, each one running one browser (Chrome, Firefox, Brave, Tor) will visit a web server that is designed for collecting fingerprints. Each configuration will interact with the web server 10 times each.
Each browser will be tested with no extensions, then each individual extension and finally with all extensions together. Tor will be tested with no extensions only.
Fingerprint uniqueness will be measured using collision based scoring and rarity surprisal while stability was assessed by comparing attributes across repeated sessions.



Next Steps

This study's direction is set to change to an area that has been more neglected. It has been observed that there is a gap in the research when it comes to fingerprint stability. It is mentioned quite a bit but also never thoroughly examined.
The updated literature review is yet to determine the specific methodology of the new direction but as of right now I'm hoping to explore the thresholds between when a fingerprint moves from being considered the same device to when it is identified as a completely new device.