

EXAMINING CONSUMER REVIEWS TO UNDERSTAND SECURITY AND PRIVACY ISSUES IN THE MARKET OF SMART HOME DEVICES

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The S in IoT stands for security.

IoT devices lack sufficient security and privacy.

Lack of incentives for manufacturers – consumer demand could serve as an incentive.

Research shows consumers care for and are willing to pay for better security and privacy.

The problem still is information asymmetry at the point of purchase. Initiatives like security labels introduce signals of device quality.

Consumer Reviews

An existing avenue for signals on device quality that buyers consider before purchasing.

Examining consumer reviews that discuss security and privacy aspects can yield valuable insights.

-  Understand users' security and privacy concerns.
-  See to what extent these reviews serve as 'market signals' for security and privacy.
-  Identify areas for action to inform IoT device purchase decisions.

Estimates of references to privacy in consumer reviews vary.

Significant percentage¹ to 2%² of reviews of smart home assistants express privacy concerns.

The studies used unsupervised machine learning techniques to analyse reviews.

¹ L. Manikonda, A. Deotale, and S. Kambhampati, "What's up with privacy? User preferences and privacy concerns in intelligent personal assistants," in Proceedings of the 2018 AAAI/ACM Conference on AI, Ethics, and Society, 2018, pp. 229-235.

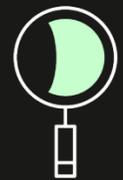
² N. Fruchter and I. Liccardi, "Consumer attitudes towards privacy and security in home assistants," in Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems, ser. CHI EA '18. New York, NY, USA: Association for Computing Machinery, 2018, p. 1-6. [Online]. Available: <https://doi.org/10.1145/3170427.3188448>

Few privacy concerns expressed in reviews of human and pet wearables.³

The study used thematic analysis to compare the content of reviews referring to privacy.

³ D. van der Linden, M. Edwards, I. Hadar, and A. Zamansky, "Pets without PETs: On pet owners' underestimation of privacy concerns in pet wearables." Proc. Priv. Enhancing Technol., vol. 2020, no. 1, pp. 143-164, 2020.

Research Questions



What fraction of customer reviews of IoT devices mention security or privacy?



When security or privacy is mentioned, what themes are being articulated?

Device Types



Surveillance Systems



Set-top Boxes



Smart home hubs



Routers



Once vulnerable routers

Amazon Websites



Australia



Canada



India



Singapore



UK



USA

Research Scope

Product links collected

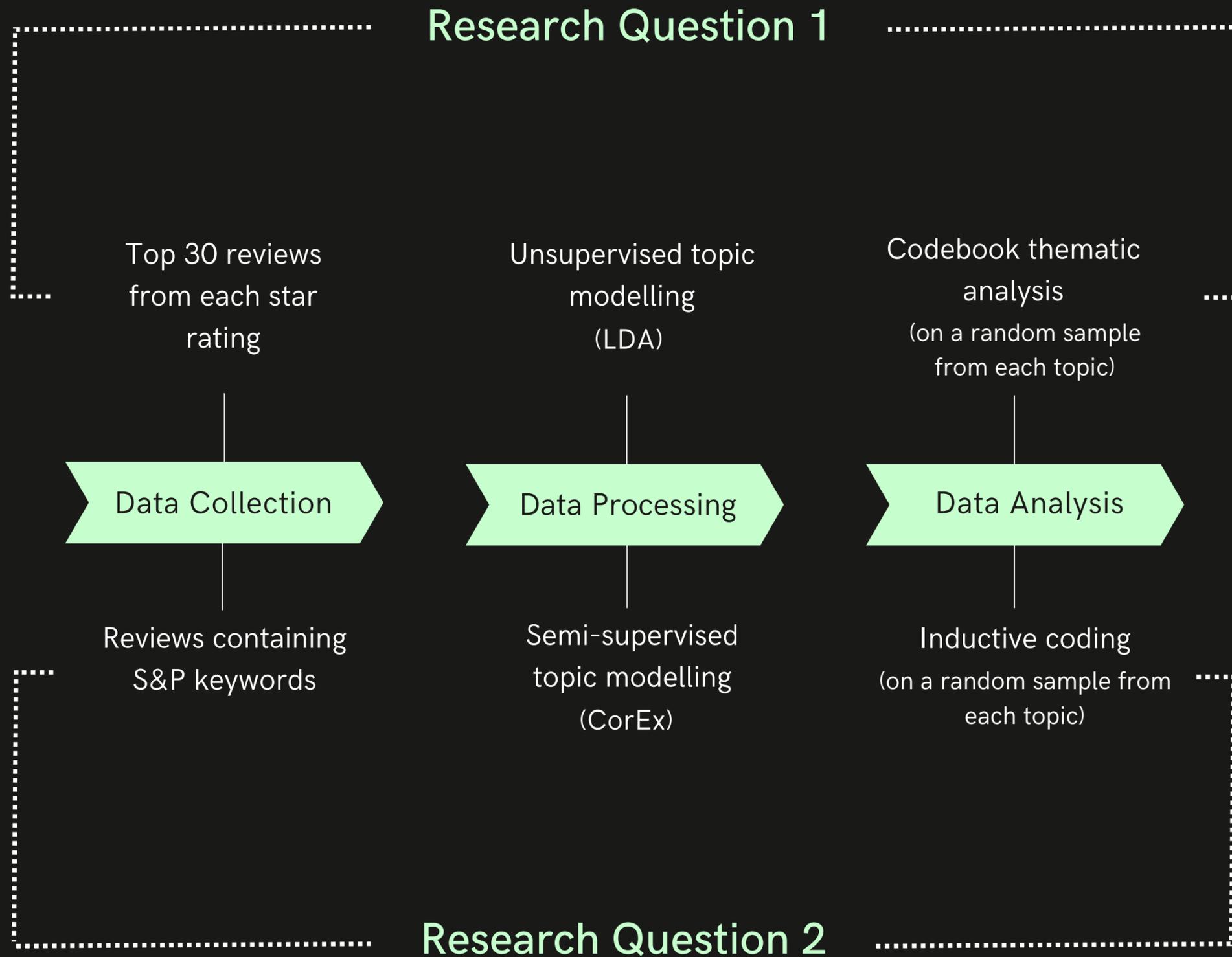
Device Types

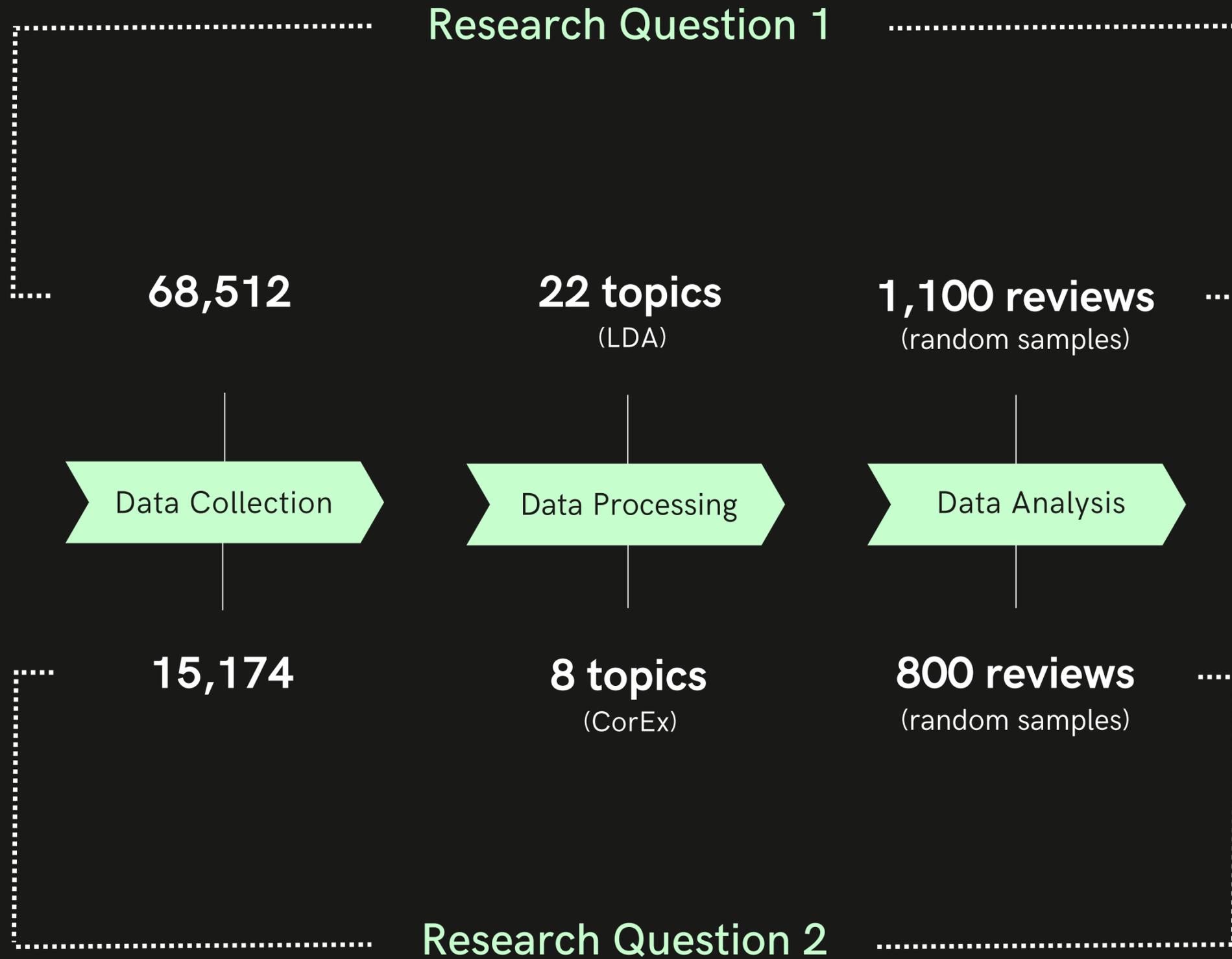
881	54	41	372	68
Surveillance Systems	Set-top Boxes	Smart home hubs	Routers	Once vulnerable routers

Amazon Websites

220	445	136	124	265	207
Australia	Canada	India	Singapore	UK	USA

Methodology

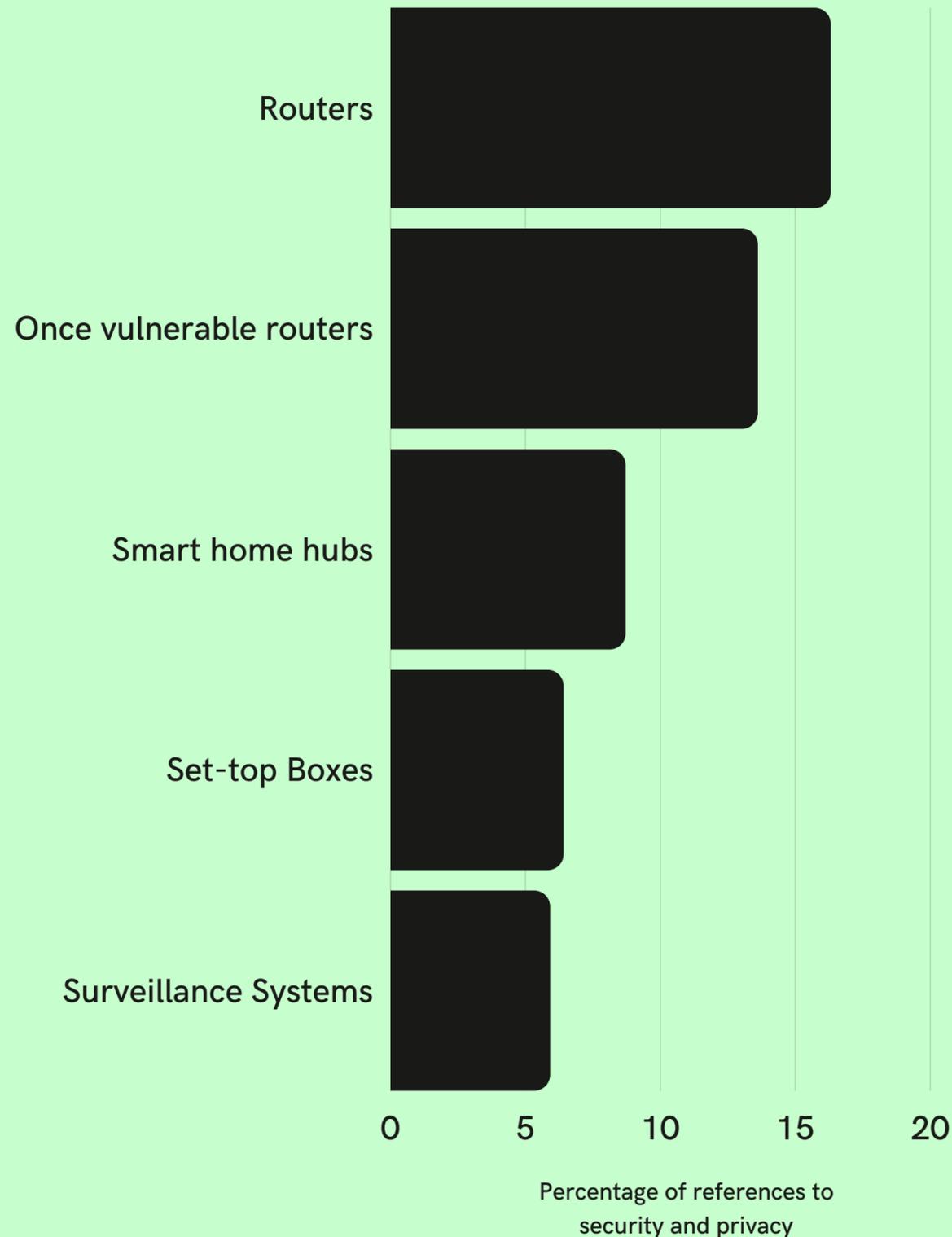




**Reviews
collected**

About one in ten reviews (9.8%) mention security and privacy (S&P). On the one hand, this is a minor fraction of all reviews. On the other hand, it does mean that potential buyers browsing reviews stand a decent chance of encountering comments on the S&P properties of the devices they are looking at. It also means that review writers feel these aspects are important enough to mention them one in ten times, which is a non-trivial amount given the brevity of most reviews: the average review in this dataset contains 100 words (median: 65). That is less than the length of this paragraph (106 words).

**9.8% of reviews
mention security
or privacy.**



Reviews of routers contains highest percentage of references (16.3%).

Once vulnerable routers have slightly lower percentage of references compared to routers. The difference is not statistically significant.

The differences across device types cannot be explained by thematic differences across device types.

The themes identified appear across all the device types.

We identified seven themes across all reviews that mention security or privacy.

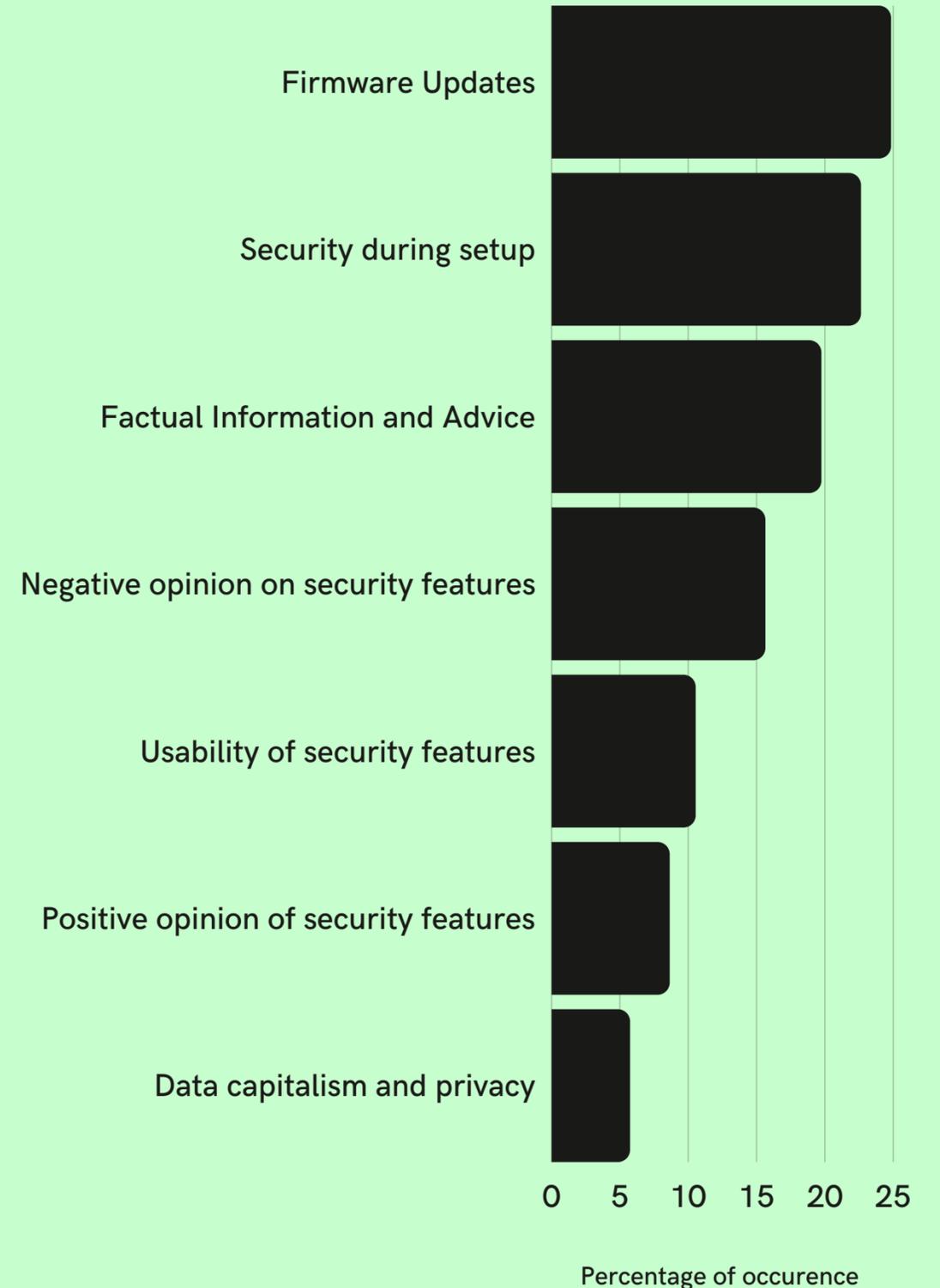
Consumers express different opinions about the same feature.

I accessed the app to see if I was about to be burgled or needed to speak to a visitor. And what did I get? 'You need to setup 2 factor authentication before we will let you access your system'...

- Review of an IP Camera

"The phone app also has 2 factor authentication (YEAH!! All apps should!! don't let the hackers into your IoT because they stole or guessed your password!)

- Review of an IP Camera



There are security and privacy signals in consumer reviews.

Highlight security and privacy related reviews.

Security and privacy specific rating will help parse sentiment expressed.

Use the review system to match advice to emergent concerns.

Consumers more likely to follow security and privacy advice when it matches their concerns.

Design for shortcuts in security features.

Balance the need of non-technical users with users with more technical acumen.

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