




Does Online Anonymous Reputation Matter?

Alejandro Cuevas – acuevasv@andrew.cmu.edu

Nicolas Christin – nicolasc@andrew.cmu.edu


Suppose you want to buy new headphones...



Beats by Dr. Dre Studio3 Bluetooth On Ear Wireless Headphones
Brand New

\$79.99
or Best Offer
+\$8.12 shipping
60 watchers


Save up to 15% when you buy more
jwalls_studio (0) 0%



jwalls_studio

56 items sold 4 followers


No feedback



Beats Studio Pro Wireless Bluetooth Noise Cancelling Headphones - Excellent
Excellent - Refurbished

\$140.00
Buy It Now
Free 3 day shipping
Free returns
eBay Refurbished
69+ sold

Top Rated Plus
amazing-wireless (136,009) 99.3%



Amazing Wireless

99.3% positive feedback 814K items sold 38K followers

99.3% positive feedback

Reputation signals facilitate trust between buyers and sellers

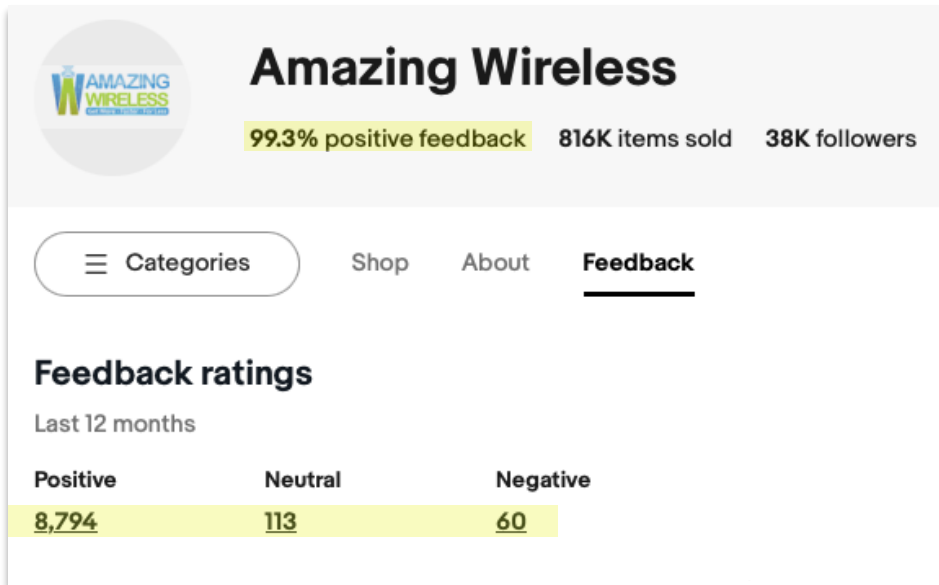
99.3% positive feedback

38K followers

amazing-wireless (136,009) 99.3%

 rated 5 stars 17 min ago

 ~ 99,173

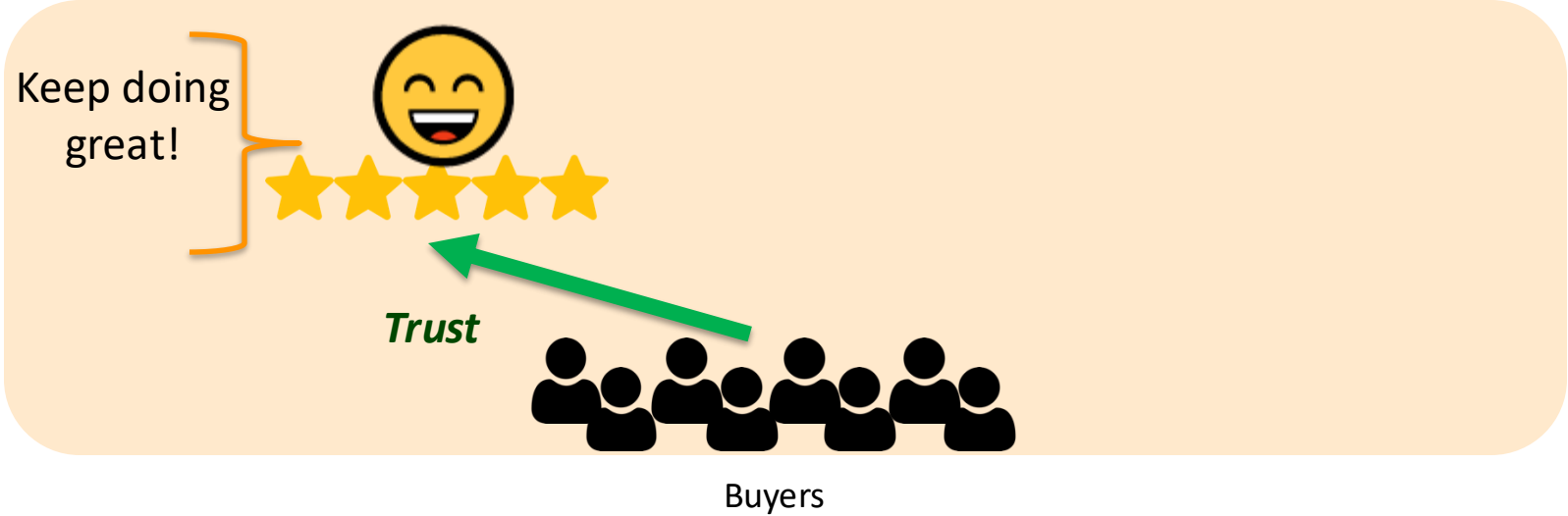


The screenshot shows the Amazon seller profile for 'Amazing Wireless'. At the top left is the seller's logo, a blue 'W' with 'AMAZING WIRELESS' text. To the right of the logo, the seller's name 'Amazing Wireless' is displayed in a large, bold font. Below the name, three key metrics are shown: '99.3% positive feedback' (highlighted in yellow), '816K items sold', and '38K followers'. Below these metrics are three navigation buttons: 'Categories' (with a hamburger menu icon), 'Shop', and 'Feedback' (which is underlined and selected). The 'Feedback ratings' section follows, showing data for the 'Last 12 months'. It features a table with three columns: 'Positive', 'Neutral', and 'Negative'. The values are 8,794, 113, and 60 respectively, with the 'Positive' and 'Negative' cells highlighted in yellow.

Positive	Neutral	Negative
8,794	113	60

Better reputation should lead to **more** trust and **more** sales

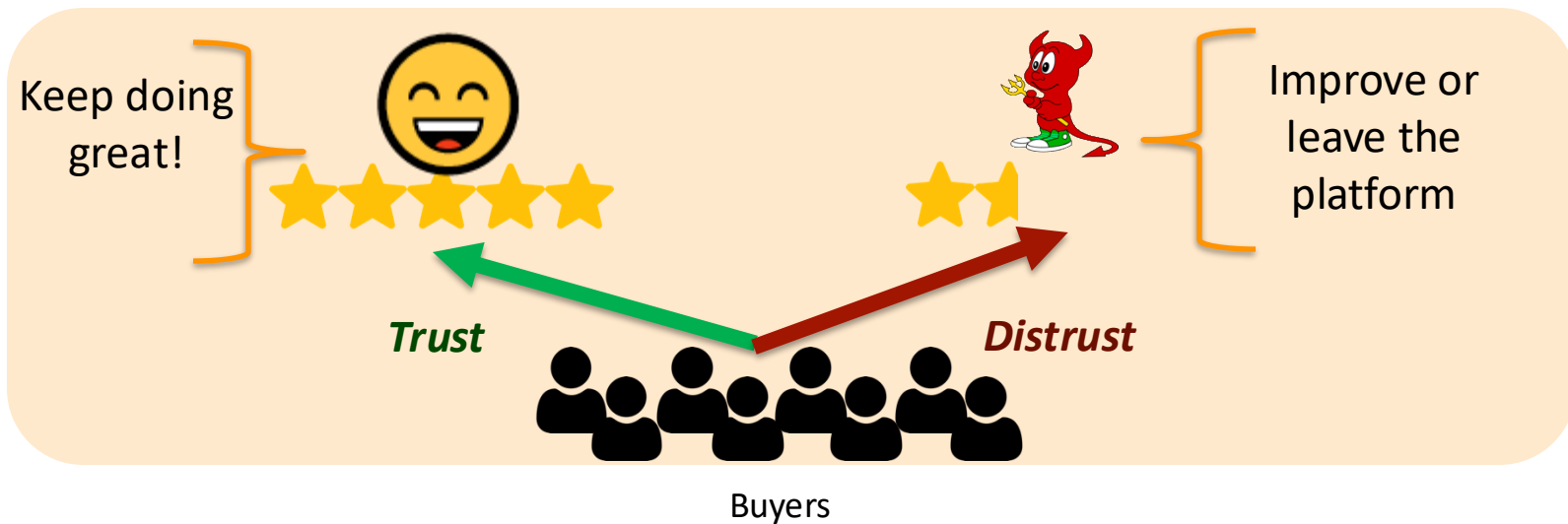
★★★★★ Great Headphones at a great price!



Bad reputation should lead to *less* trust and *less* sales

★★★★★ Great Headphones at a great price!

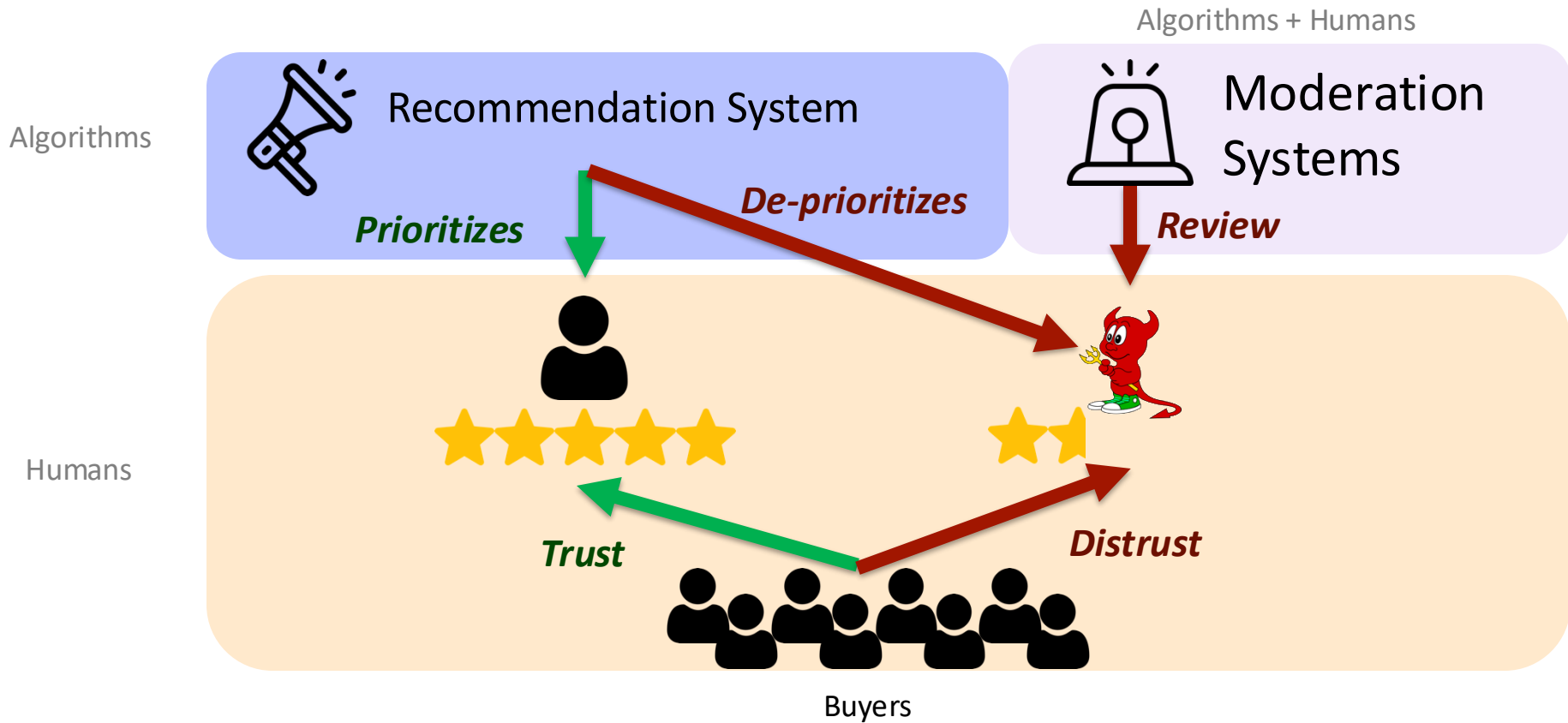
★☆☆☆☆ DO NOT BUY THESE!!!! They are trying to trick you!



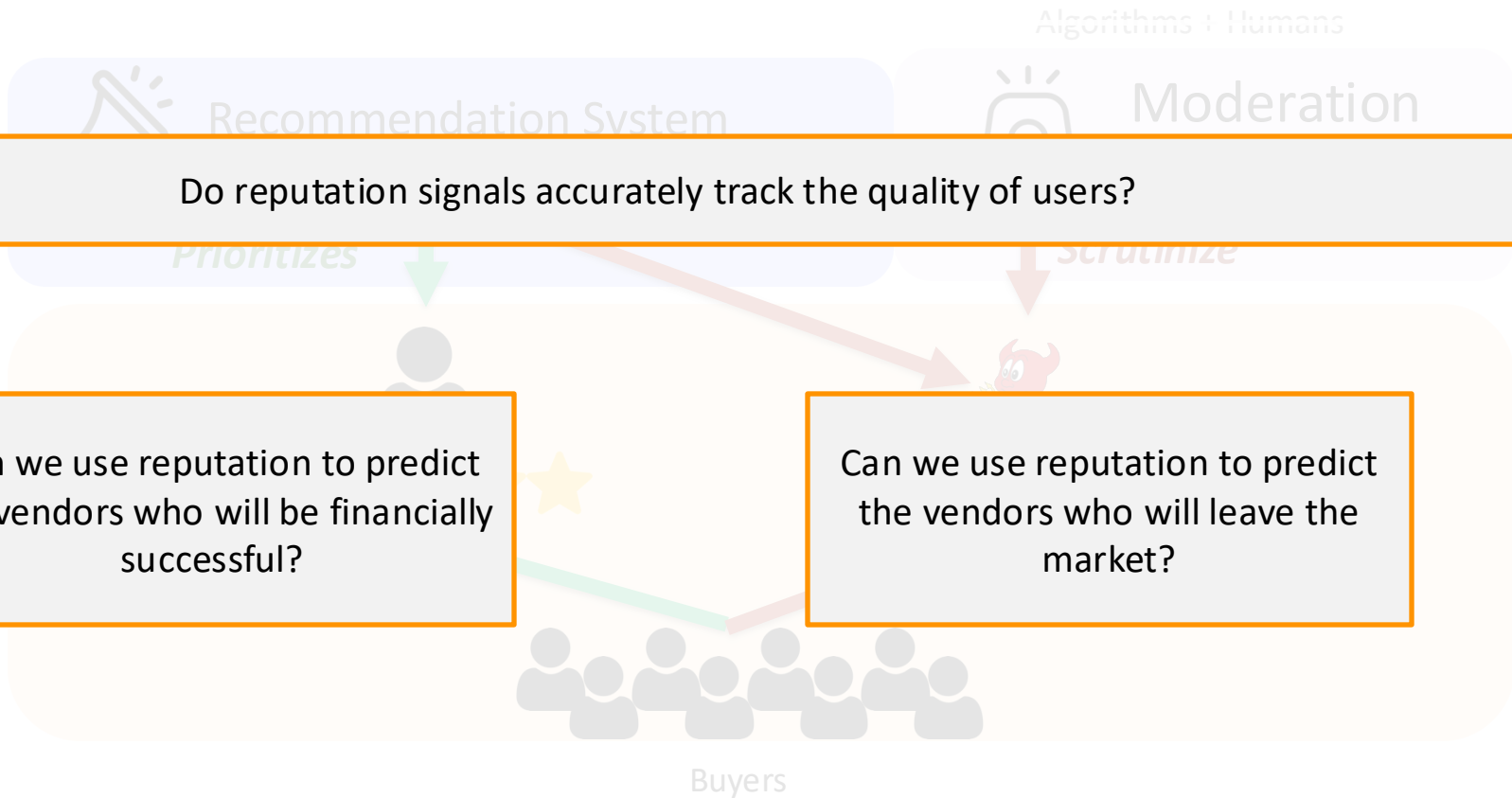
Reputation signals are everywhere



Reputation signals feed into other systems

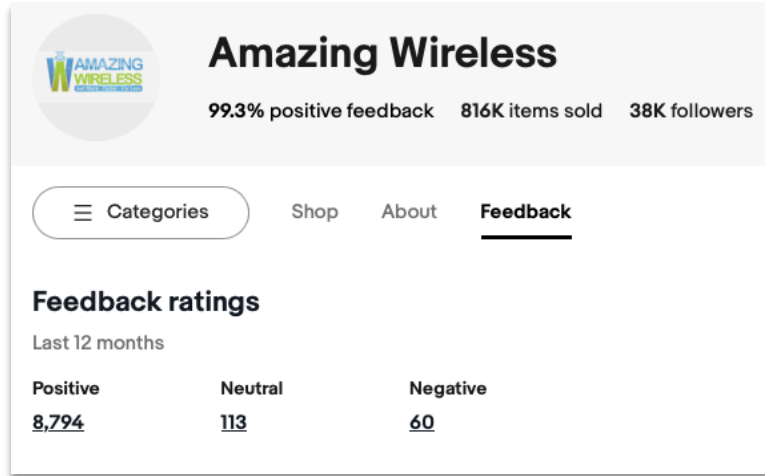


Reputation signals feed into other systems



Online anonymous markets (OAMs) behave just like the traditional markets we are used to

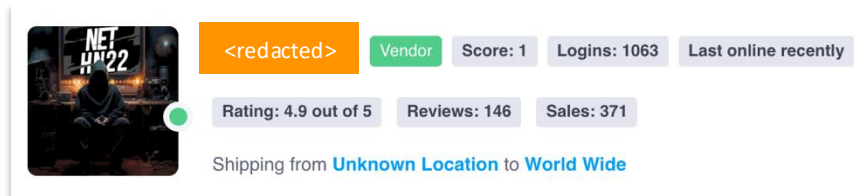
A vendor on eBay



The screenshot shows the profile of 'Amazing Wireless' on eBay. It features a circular profile picture with the company logo, a header with the name 'Amazing Wireless', and statistics: '99.3% positive feedback', '816K items sold', and '38K followers'. Below the header are navigation tabs for 'Categories', 'Shop', 'About', and 'Feedback'. The 'Feedback ratings' section shows data for the last 12 months:

Positive	Neutral	Negative
8,794	113	60

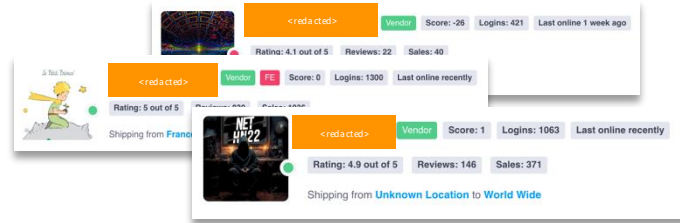
A vendor on Nemesis Market



The screenshot shows a vendor profile on Nemesis Market. It includes a profile picture, a redacted name, and several statistics in colored boxes: 'Vendor' (green), 'Score: 1' (orange), 'Logins: 1063' (grey), 'Last online recently' (grey), 'Rating: 4.9 out of 5' (grey), 'Reviews: 146' (grey), and 'Sales: 371' (grey). Below these is the shipping information: 'Shipping from Unknown Location to World Wide'.

OAMs are a great place to study reputation

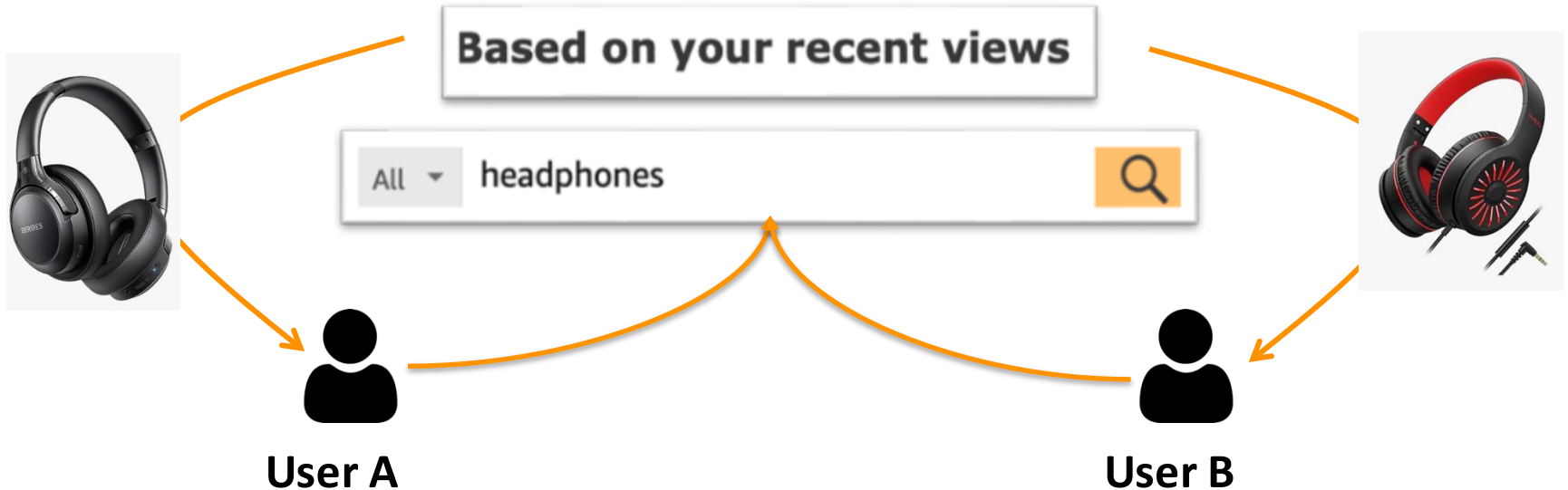
1. We have validated methods to estimate sales [Cuevas et al. USENIX'22]
 - And we have a comprehensive dataset



8 individual markets (2011-2023)
>16,000 vendors

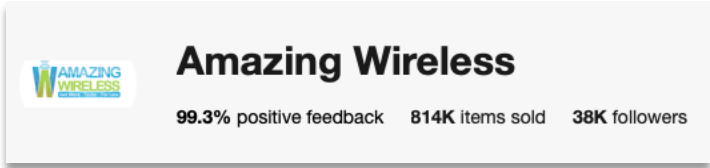
OAMs are a great place to study reputation

1. We have validated methods to estimate sales [Cuevas et al. USENIX'22]
2. Little (if any) algorithmic interference in users' search



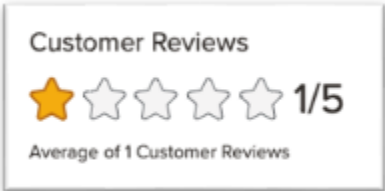
OAMs are a great place to study reputation

1. We have validated methods to estimate sales [Cuevas et al. USENIX'22]
2. Little (if any) algorithmic interference in users' search
3. Few external signals about vendors



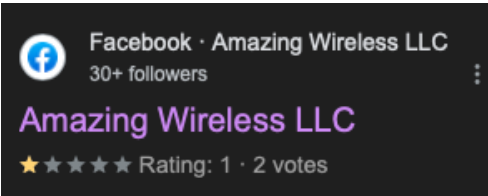
Amazing Wireless
99.3% positive feedback 814K items sold 38K followers

eBay



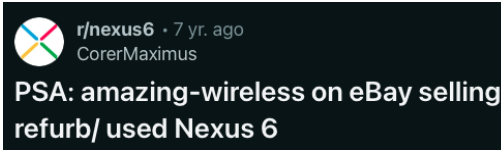
Customer Reviews
★☆☆☆☆ 1/5
Average of 1 Customer Reviews

BBB



Facebook · Amazing Wireless LLC
30+ followers
Amazing Wireless LLC
★☆☆☆☆ Rating: 1 · 2 votes

Facebook



r/nexus6 · 7 yr. ago
CorerMaximus
PSA: amazing-wireless on eBay selling refurb/ used Nexus 6

Reddit

OAMs are a great place to study reputation

1. We have validated methods to estimate sales [Cuevas et al. USENIX'22]
2. Little (if any) algorithmic interference in users' search
3. Few external signals about vendors
4. Reputation is **EXTREMELY** important and users often leave reviews

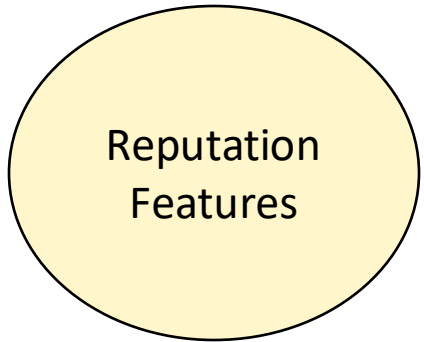
HEROIN 0.25G - LION STAMP - CHINA WHITE - INTL IMPORT - PREMIUM - SPEC.

Heroin Australia → Australia

Sold by: <redacted>	<redacted> Trusted		
	Feedback: 99.85% Level 9	BTC 0.00119771	USD 78.00
	Other Feedback: No Records	XMR 0.66384369	Place Order >
	Payment: FE (100%)		

Listing Feedback: ★★★★★ Views: 2132 | Sales: 339

Reputation features include any features derived from ratings by other users

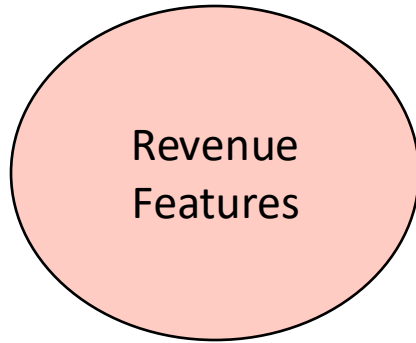
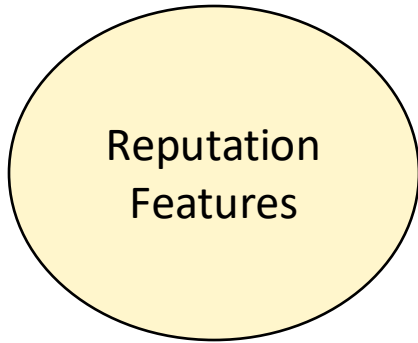


<redacted> Trusted
99.85% Level 9
Feedback: No Records
Payment: FE (100%)
★★★★★

E.g.,

HEROIN 0.25G - LION STAMP - CHINA WHITE - INTL IMPORT - PREMIUM - SPEC.
Heroin Australia → Australia
Sold by: <redacted> Trusted
Feedback: 99.85% Level 9
Other Feedback: No Records
Payment: FE (100%)
BTC 0.00119771 USD 78.00
XMR 0.66384369 Place Order
Listing Feedback: ★★★★★ Views: 2132 | Sales: 339

Revenue features include data about sales, such as the number of sales or rolling averages



Sales: 339

E.g.,

HEROIN 0.25G - LION STAMP - CHINA WHITE - INTL IMPORT - PREMIUM - SPEC.

Heroin Australia → Australia

Sold by: <redacted> Trusted

Feedback: 99.85% Level 9

Other Feedback: No Records

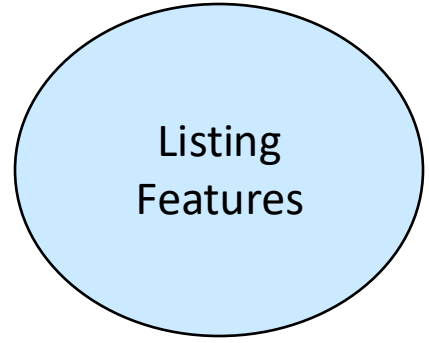
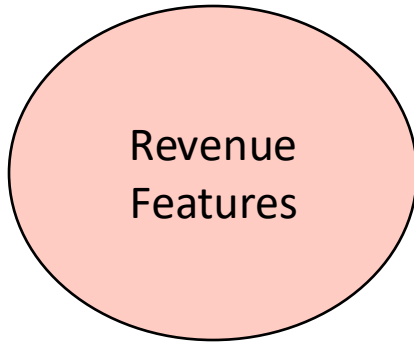
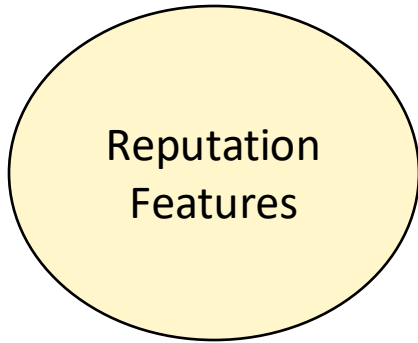
Payment: FE (100%)

BTC 0.00119771 USD 78.00

XMR 0.66384369 Place Order >

Listing Feedback: ★★★★★ Views: 2132 Sales: 339

Listing features include things like the category of goods, the price, or where it ships from



E.g.,

HEROIN 0.25G - LION STAMP - CHINA WHITE - INTL IMPORT - PREMIUM - SPEC.

Heroin

Australia → Australia

Sold by: <redacted> Trusted

Feedback: 99.85% Level 9

Other Feedback: No Records

Payment: FE (100%)

BTC 0.0011971 USD 78.00

XMR 0.663843

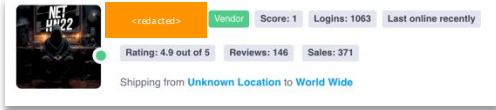
Place Order >

Listing Feedback: ★★★★★

Views: 2132 | Sales: 339

Does reputation predict the financial success?

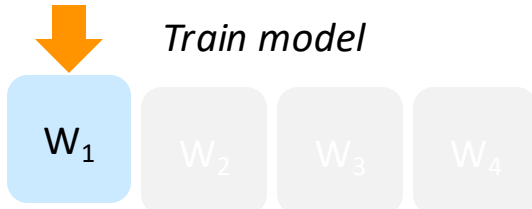
1



Grab all available vendors

2

Month 1



...

Month n

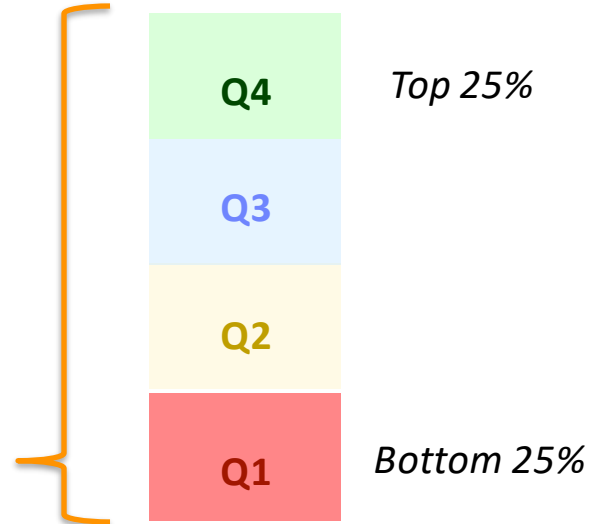


Weeks

3

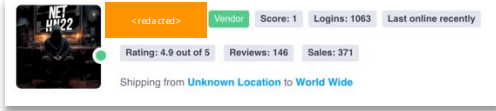
Predict earning bracket

Wealth Quartiles



Does reputation predict the financial success?

1



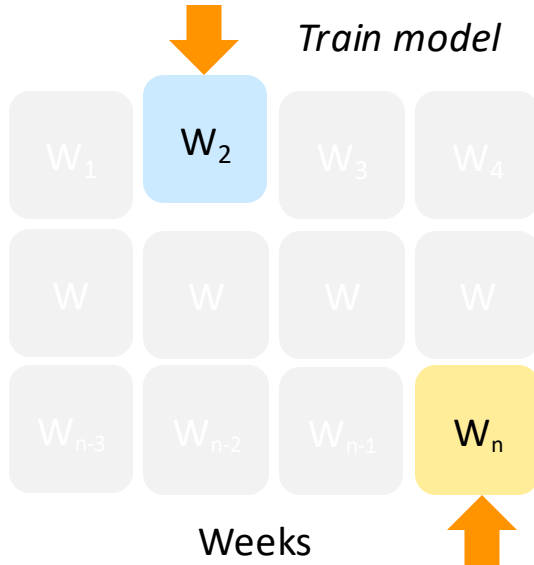
Grab all available vendors

2

Month 1

...

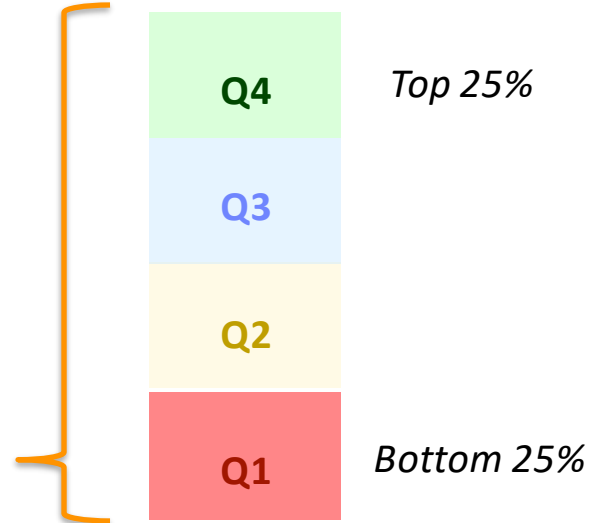
Month n



3

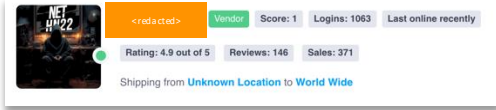
Predict earning bracket

Wealth Quartiles



Does reputation predict the financial success?

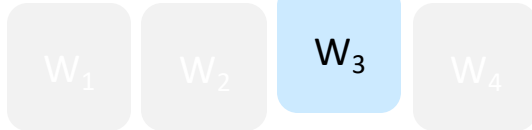
1



Grab all available vendors

2

Month 1



Train model

...

Month n

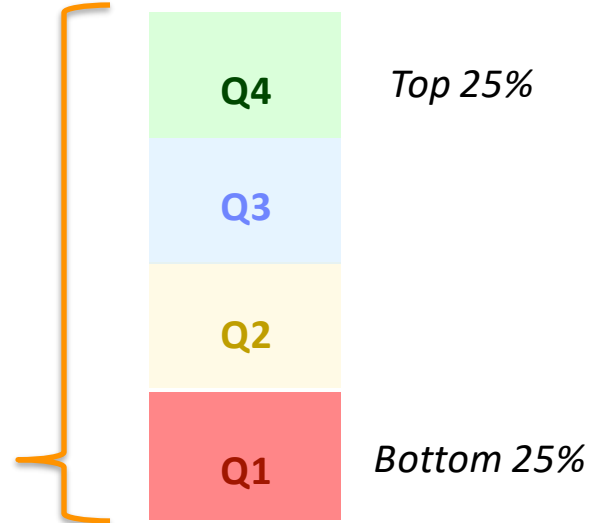


Weeks

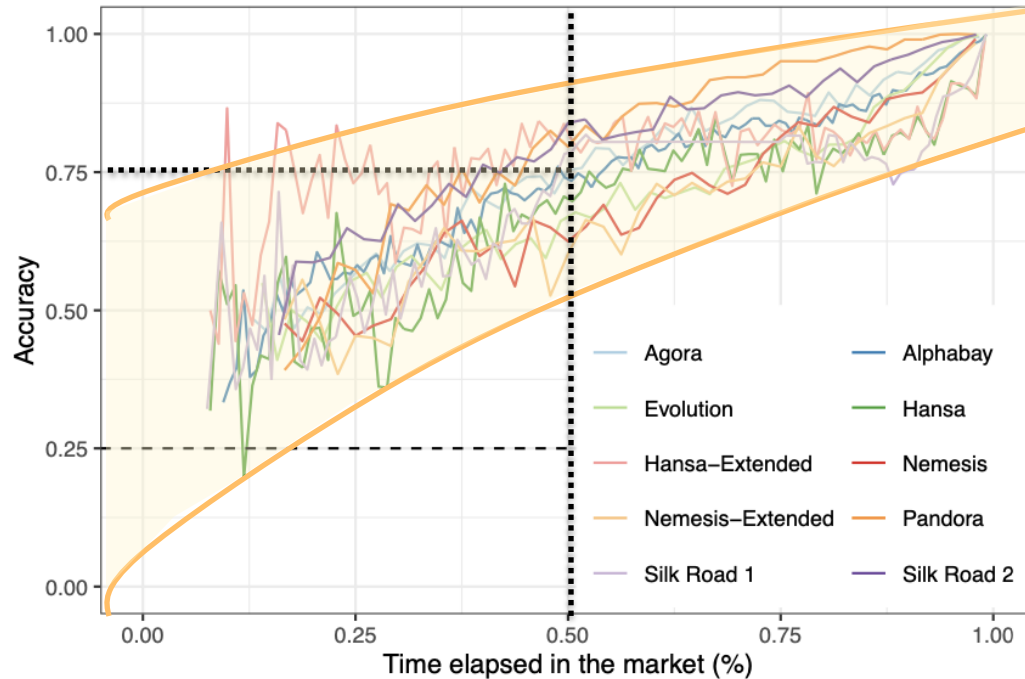
3

*Predict earning
bracket*

Wealth Quartiles



We can predict success quite well using simple a model



Halfway through a market's lifetime we had ~75% accuracy

If we remove reputation features...

HEROIN 0.25G - LION STAMP - CHINA WHITE - INTL IMPORT - PREMIUM - SPEC.

Heroin Australia → Australia

<redacted>	Sold by:	<redacted>	Trusted
	Feedback:	99.85%	Level 9
	Other Feedback:	No Records	
	Payment:	FE (100%)	

₿ BTC 0.00119771

USD 78.00

₴ XMR 0.66384369

Place Order >

Listing Feedback: ★★★★★ Views: 2132 | Sales: 339

Excluded Feature(s)		Avg. Accuracy Decrease			
Feature Set 1	Feature Set 2	Min.	Max.	Mean	Std.

We see that reputation alone has little impact on the prediction

HEROIN 0.25G - LION STAMP - CHINA WHITE - INTL IMPORT - PREMIUM - SPEC.

Heroin Australia → Australia

Sold by: removed

Feedback: removed

Other Feedback: removed

Payment: removed

BTC 0.00119771 USD 78.00

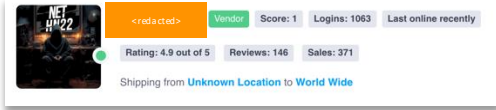
XMR 0.66384369 Place Order >

Listing Feedback: ★★★★★ Views: 2132 | Sales: 339

Excluded Feature(s)		Avg. Accuracy Decrease			
Feature Set 1	Feature Set 2	Min.	Max.	Mean	Std.
Reputation	—	<0.01	<0.01	<0.01	<0.01

Does reputation predict financial failure?

1

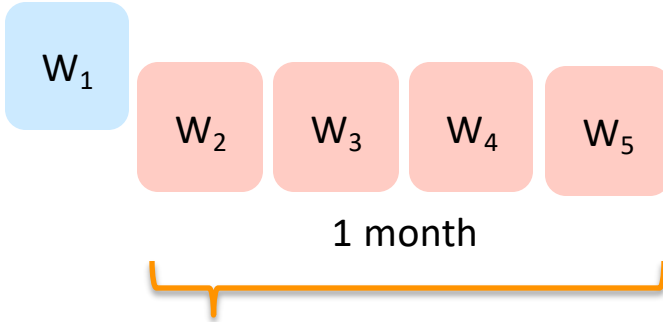


Grab all available vendors

2

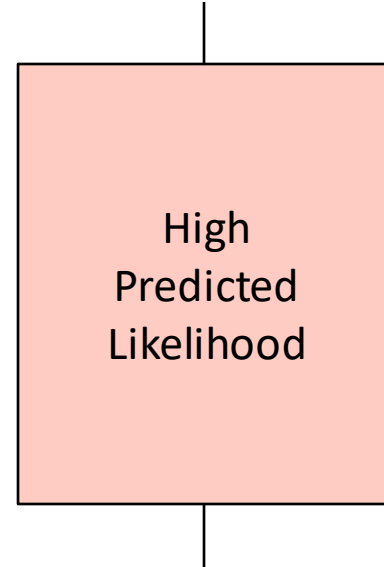


Train model



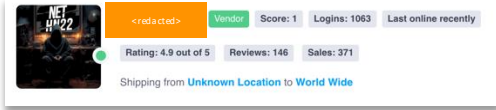
3

Predict: *Did vendor have their last sale? (y/n)*



Does reputation predict financial failure?

1



Grab all available vendors

2



Train model

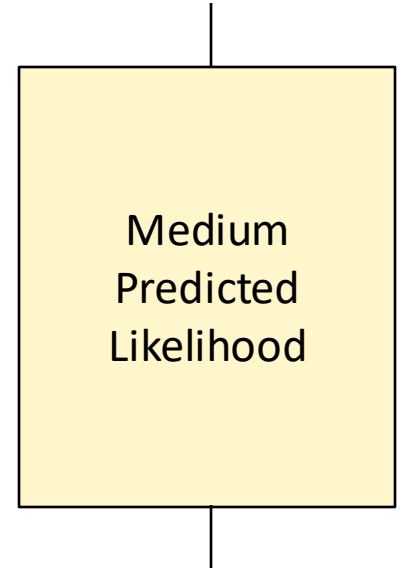
W_1



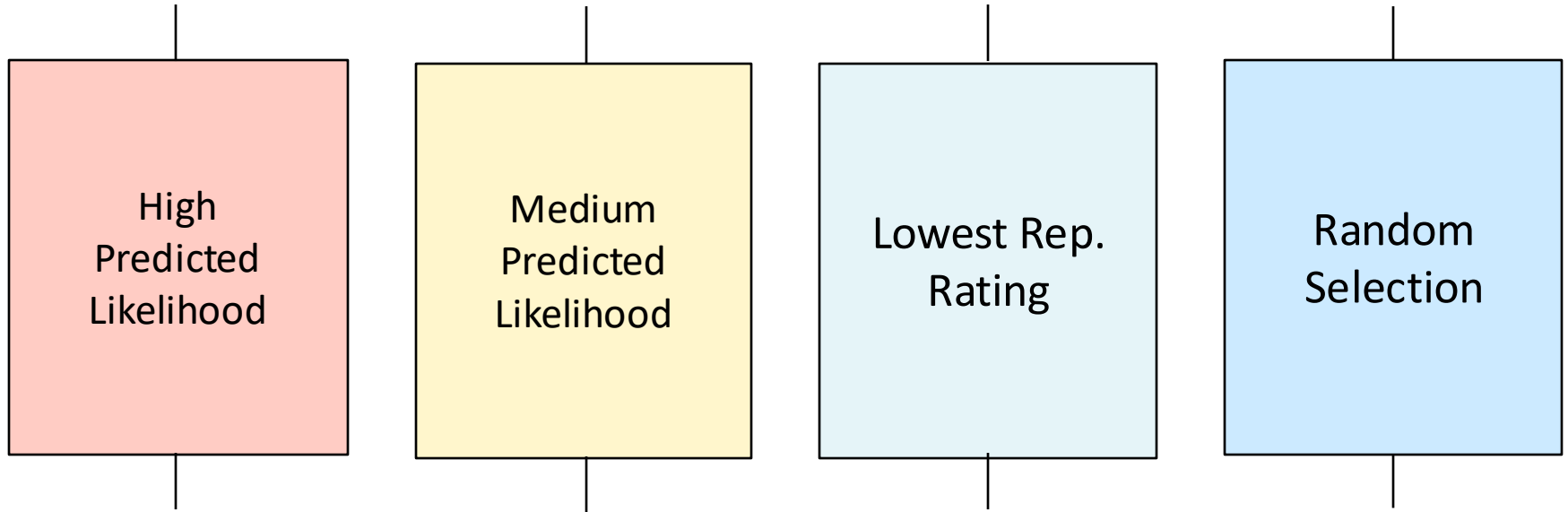
Predict: Did vendor have their last sale? (y/n)

3

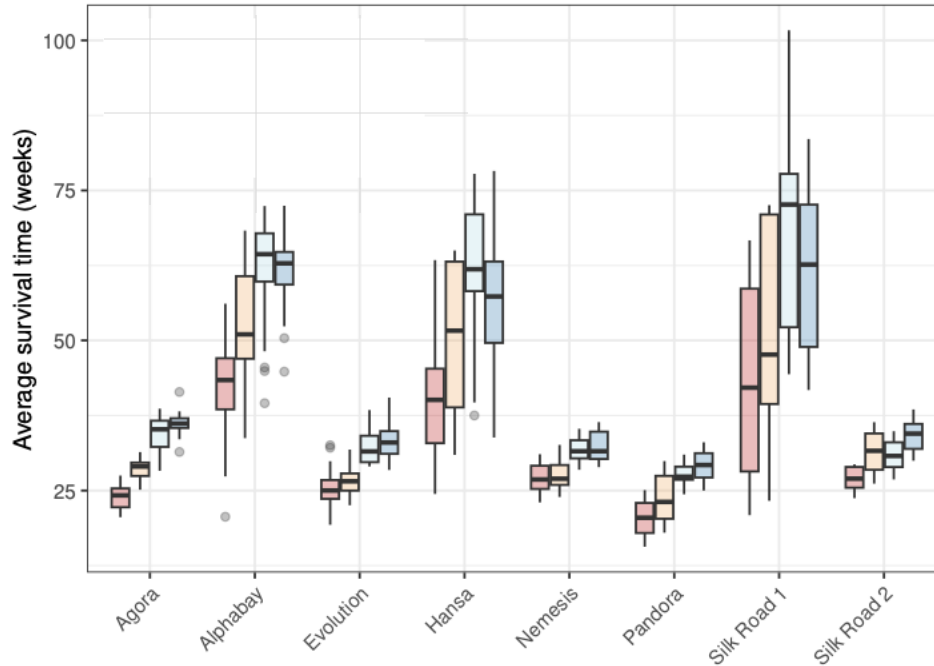
1-3 months



We assemble 4 groups of n vendors across markets



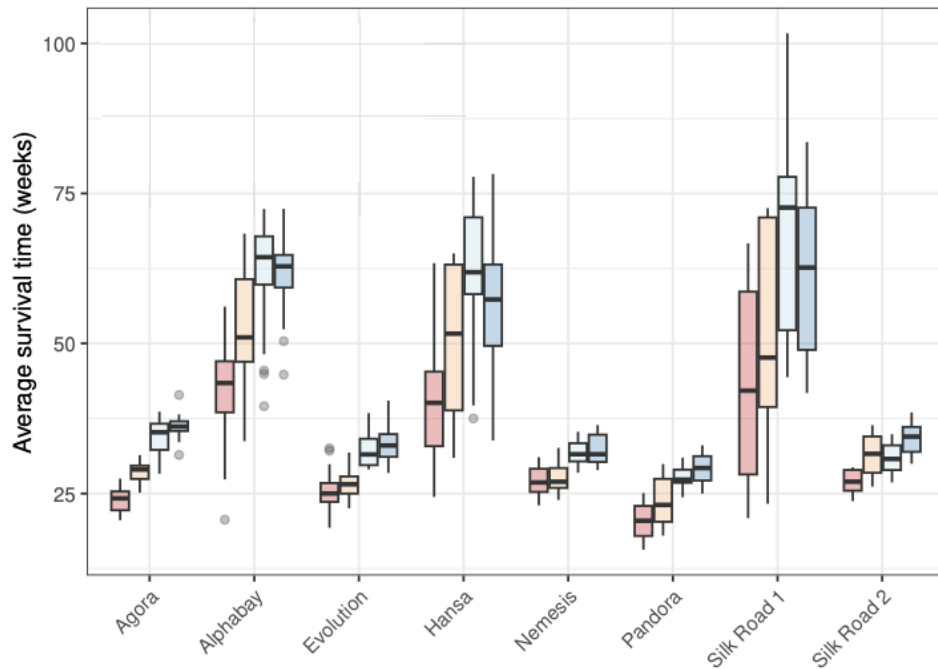
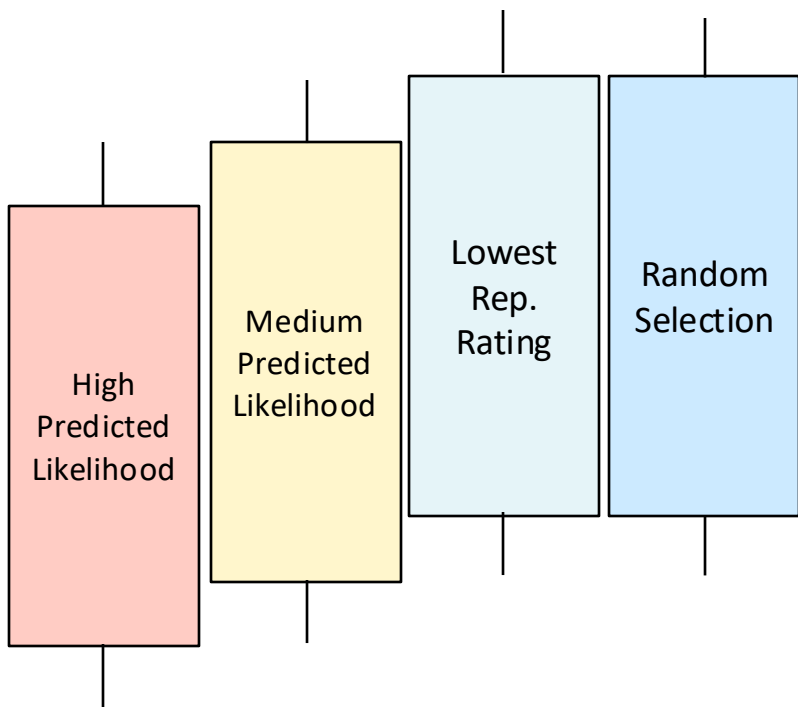
Public signals can help you identify vendors who will leave the market



Shorter boxplot means shorter lifespan

Differing y-axis lengths are due to different market lengths

Reputation alone is not a good indicator



We can identify users who will disappear faster using a combination of signals

Reputation systems can be a powerful tools,
but they have become less effective

The New York Times


Fake Reviews Are Rampant Online. Can a Crackdown End Them?

THE WALL STREET JOURNAL

Special Off

Business U.S. Politics Economy Tech Markets & Finance Opinion Arts Lifestyle Real Estate Personal Finance Health

Black Friday Shoppers: Beware of Fake Five-Star Reviews



1. We introduce a new method to evaluate reputation systems in marketplaces

2. We demonstrate that reputation alone has little impact, but effective predictions rely on a variety of public signals

3. We highlight the need to continuously evaluate signals and suggest how we can design more effective reputation systems

Alejandro Cuevas –

acuevasv@andrew.cmu.edu

alejandrocuevas.me



Carnegie Mellon University
Security and Privacy Institute


Our model mostly generalizes across markets and time

For all markets:

Train a model on n-1
markets



Test model on 1
market (the 'holdout')

 Training score

 Holdout score

