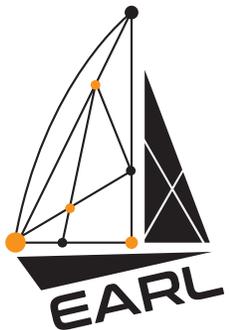


Looking for Hypergiants in PeeringDB

Timm Böttger, Felix Cuadrado and Steve Uhlig

timm.boettger@qmul.ac.uk



Hypergiants?



Google



facebook®



twitch



NETFLIX



Akamai

What would we need?

- Hypergiants are the 'biggest of the biggest'
 - Indication of **traffic volume**
- Hypergiants are global
 - Indication of **geographic reach**
- Hypergiants seem to be heavy on content
 - Indication of **traffic balance**

PeeringDB - Webinterface

PeeringDB [Register or](#) [Login](#)

[Advanced Search](#)

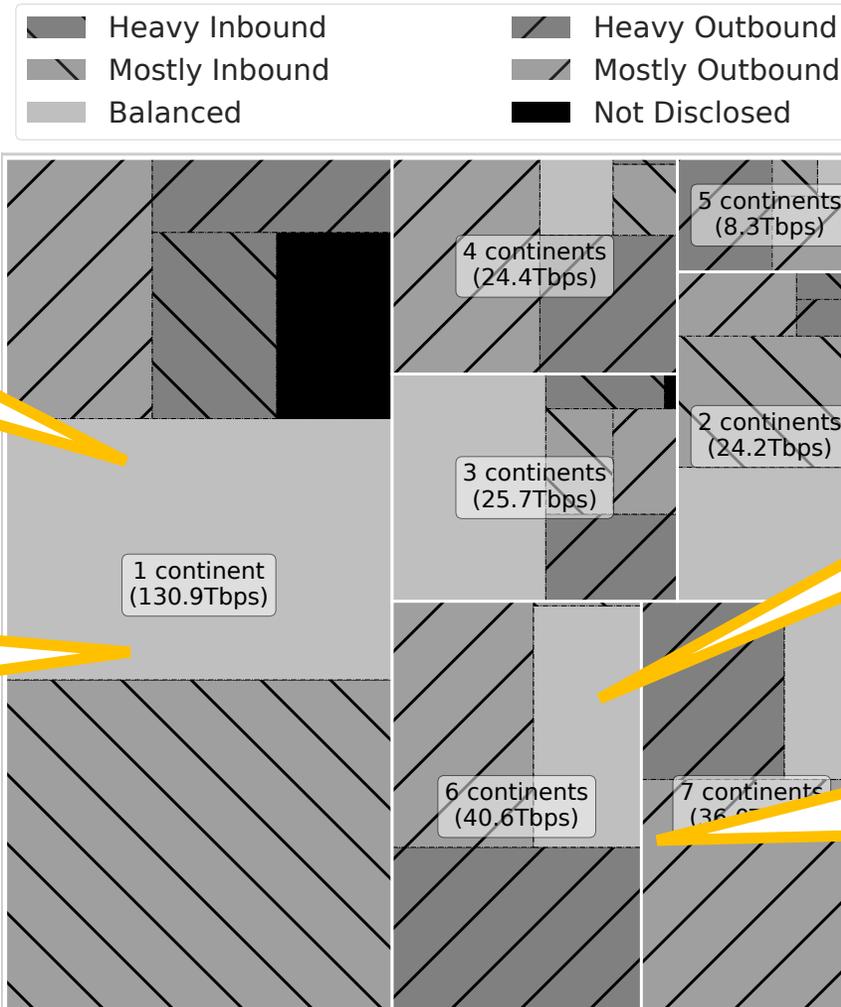
Netflix

Organization	Netflix
Also Known As	
Company Website	
Primary ASN	2906
IRR Record	as-nflx
Route Server URL	
Looking Glass URL	
Network Type	Content
IPv4 Prefixes	250
IPv6 Prefixes	250
Traffic Levels	10 Tbps+
Traffic Ratios	Heavy Outbound
Geographic Scope	Global
Protocols Supported	<input checked="" type="checkbox"/> Unicast IPv4 <input type="checkbox"/> Multicast <input checked="" type="checkbox"/> IPv6
Last Updated	2018-06-18T15:40:23Z
Notes	Why Traceroute Will Mislead You

Public Peering Exchange Points

Exchange	ASN	IPv4	IPv6	Speed	RS	Peer
AKL-IX	AKL-IX	43.243.21.76	2001:7fa:11:6:0:b5a:0:1	10G	<input checked="" type="checkbox"/>	
AKL-IX	AKL-IX	43.243.21.77	2001:7fa:11:6:0:b5a:0:2	10G	<input checked="" type="checkbox"/>	
AMS-IX	AMS-IX	80.249.211.250	2001:7f8:1::a500:2906:2	100G	<input checked="" type="checkbox"/>	
AMS-IX	AMS-IX	80.249.210.250	2001:7f8:1::a500:2906:1	100G	<input checked="" type="checkbox"/>	
BBIX Hong Kong	BBIX Hong Kong	103.203.158.74	2403:c780:b800:bb00::2906:1	10G	<input checked="" type="checkbox"/>	
BBIX Hong Kong	BBIX Hong Kong	103.203.158.75	2403:c780:b800:bb00::2906:2	10G	<input checked="" type="checkbox"/>	
BBIX Singapore	BBIX Singapore	103.231.152.76	2001:df5:b800:bb00::2906:3	10G	<input checked="" type="checkbox"/>	
BBIX Singapore	BBIX Singapore	103.231.152.77	2001:df5:b800:bb00::2906:4	10G	<input checked="" type="checkbox"/>	
BBIX Tokyo	BBIX Tokyo	218.100.6.117	2001:de8:c::2906:1	100G	<input checked="" type="checkbox"/>	
BBIX Tokyo	BBIX Tokyo	218.100.6.119	2001:de8:c::2906:2	100G	<input checked="" type="checkbox"/>	
BCIX	BCIX	193.178.185.80		100G	<input checked="" type="checkbox"/>	

Data distribution



Organisations at one continent: 45% of port capacity, yet 95% of all organisations

Organisations at one continent: mostly inbound or balanced traffic profile

Organisations at four continents or more : 38% of port capacity, yet only 1% of all organisations

Organisations at four continents or more : mostly outbound oriented

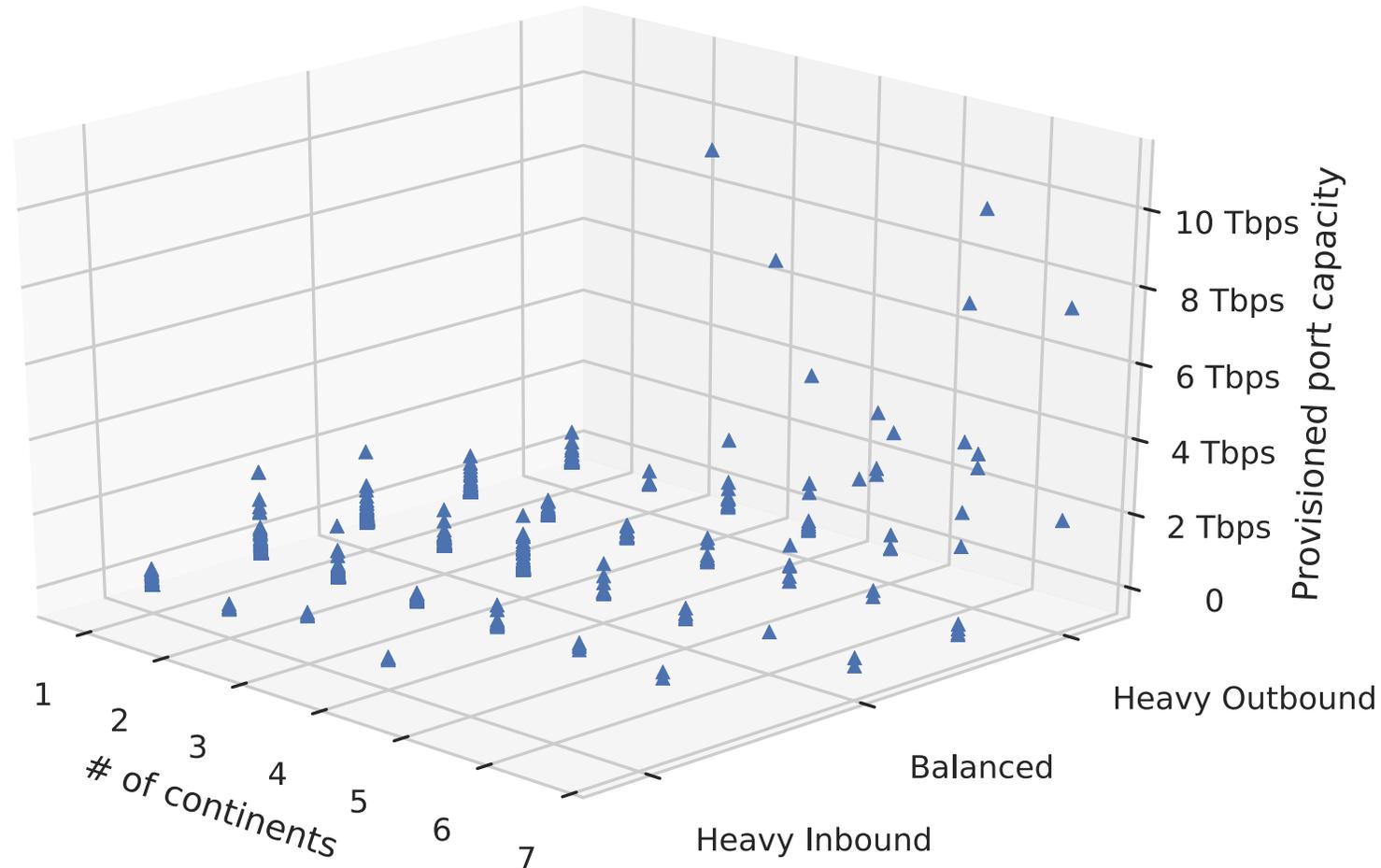
The problem

- Given the three features, classify whether an organisation is a hypergiant
 - Port capacity
 - Geographic reach
 - Traffic profile
- Sounds like something that could be solved with ML techniques
- No labels, so no supervised learning

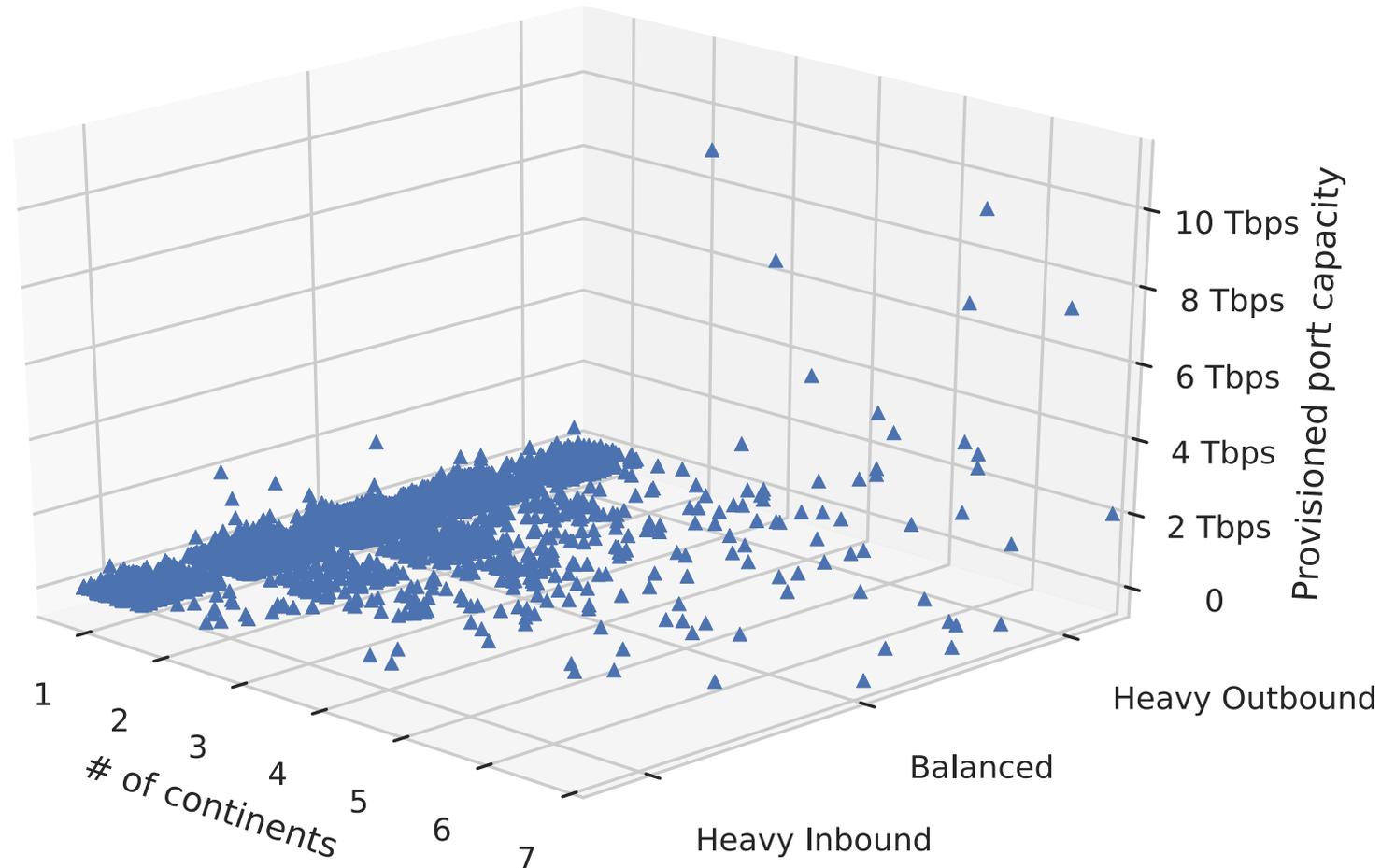
Intuition

- Hypergiants are ‘the biggest of the biggest’
- They must be different from the crowd somehow
 - On some metric the very least
- Use unsupervised learning
- Use k-means (with $k=2$) to actually get labelled data

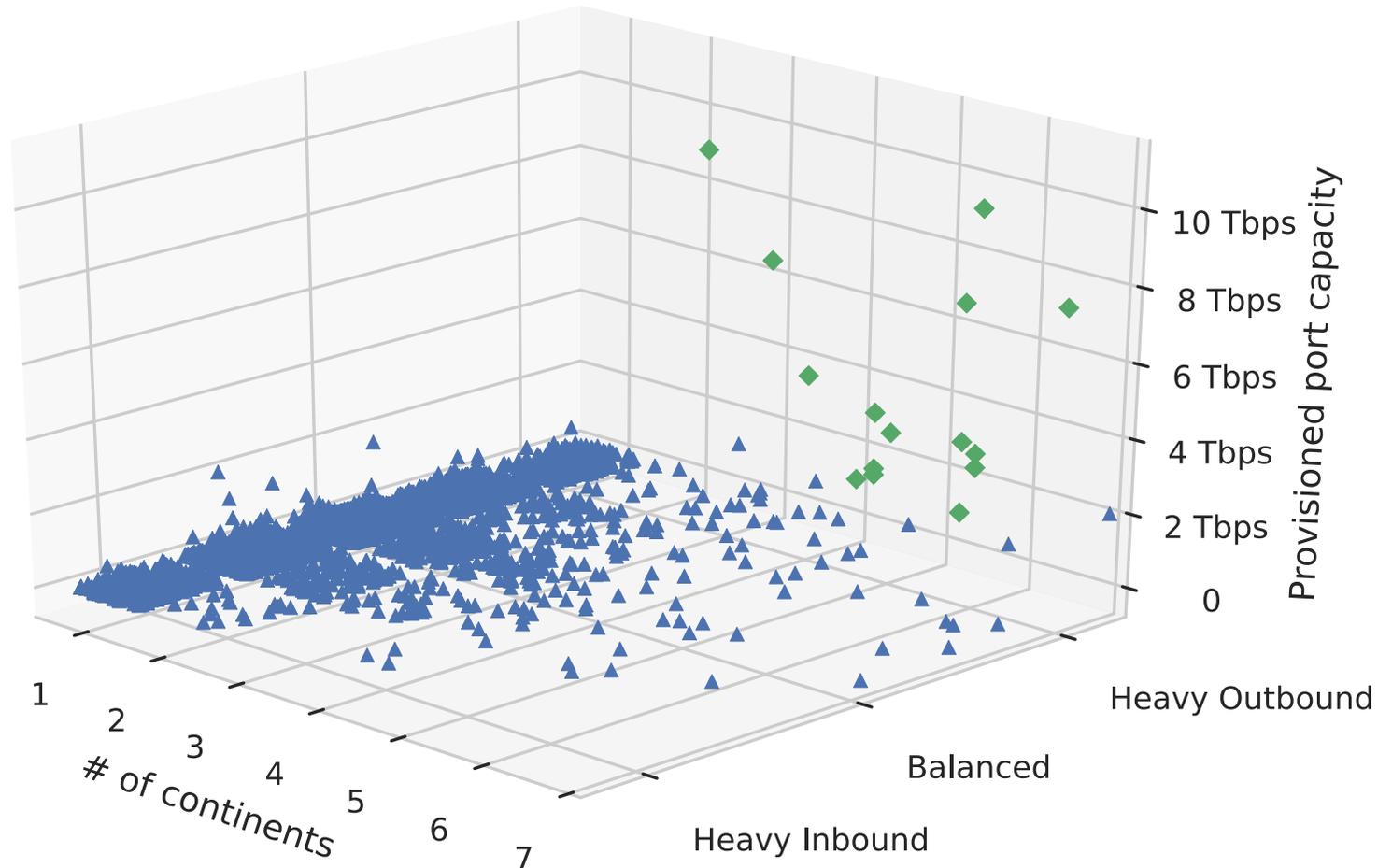
On the way...



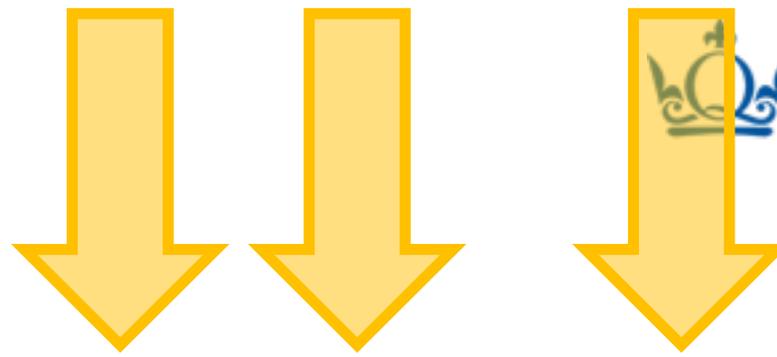
On the way...



Hypergiants!



Hypergiants!



	Organisation name	ASN	Continents	Port. Cap.	Traffic Profile
1	Apple Inc	714	4	10.960 Tbps	Mostly Outbound
2	Amazon.com	16509	6	9.991 Tbps	Balanced
3	Facebook	32934	6	9.840 Tbps	Heavy Outbound
4	Google Inc.	15169	7	8.741 Tbps	Mostly Outbound
5	Akamai Technologies	20940	7	7.854 Tbps	Heavy Outbound
6	Yahoo!	10310	6	5.310 Tbps	Mostly Outbound
7	Netflix	2906	7	5.170 Tbps	Mostly Outbound
8	Hurricane Electric	6939	7	5.037 Tbps	Balanced
9	OVH	16276	4	4.270 Tbps	Heavy Outbound
10	Limelight Networks Global	22822	6	3.840 Tbps	Mostly Outbound
11	Microsoft	8075	6	3.680 Tbps	Mostly Outbound
12	Twitter, Inc.	13414	6	3.401 Tbps	Heavy Outbound
13	Twitch	46489	5	3.340 Tbps	Heavy Outbound
14	Cloudflare	13335	7	3.320 Tbps	Mostly Outbound
15	Verizon Digital Media Services	15133	6	3.030 Tbps	Heavy Outbound



Summary

- Characterised organisations in PeeringDB
 - Provisioned port capacity
 - Geographic reach
 - Traffic profile
- Use unsupervised learning to differentiate hypergiants
- Shown that hypergiants actually are different enough to be identified by natural split in the data

Complete paper in CCR

- Complete paper with all results to appear in the July issue of ACM SIGCOMM CCR.

Looking for Hypergiants in PeeringDB

Timm Böttger
Queen Mary University of London
timm.boettger@qmul.ac.uk

Felix Cuadrado
Queen Mary University of London
felix.cuadrado@qmul.ac.uk

Steve Uhlig
Queen Mary University of London
steve.uhlig@qmul.ac.uk

Thank you very much
for listening!

Questions?