Relative Attributes

by Devi Parikh, Kristen Grauman

ICCV2011

Experiment presentation by Wei-Lin Hsiao

Question: How much improvement can we get from instance-level comparison?

Attribute/Class	Athletic	Boots	Clogs	Flats	Heels	Pumps	Rain Boots	Sneakers	Stiletto	Wedding
Pointy at the front	2	6	3	5	10	9	4	1	8	7
Open	3	2	8	5	7	6	1	4	9	10
Bright in color	6	1	2	8	4	3	10	7	9	5
Covered w/ ornaments	4	9	6	5	8	7	1	3	10	2
Shiny	2	9	4	3	6	5	8	1	10	7
High at the heel	4	6	5	1	9	8	3	2	10	7
Long on the leg	7	9	2	3	6	5	10	8	4	1
Formal	3	6	4	7	9	8	1	2	5	10
Sporty	10	5	6	7	4	3	8	9	1	2
Feminine	1	6	4	5	10	9	3	2	8	7

>
pointy at the front

>
long on the leg

>
open

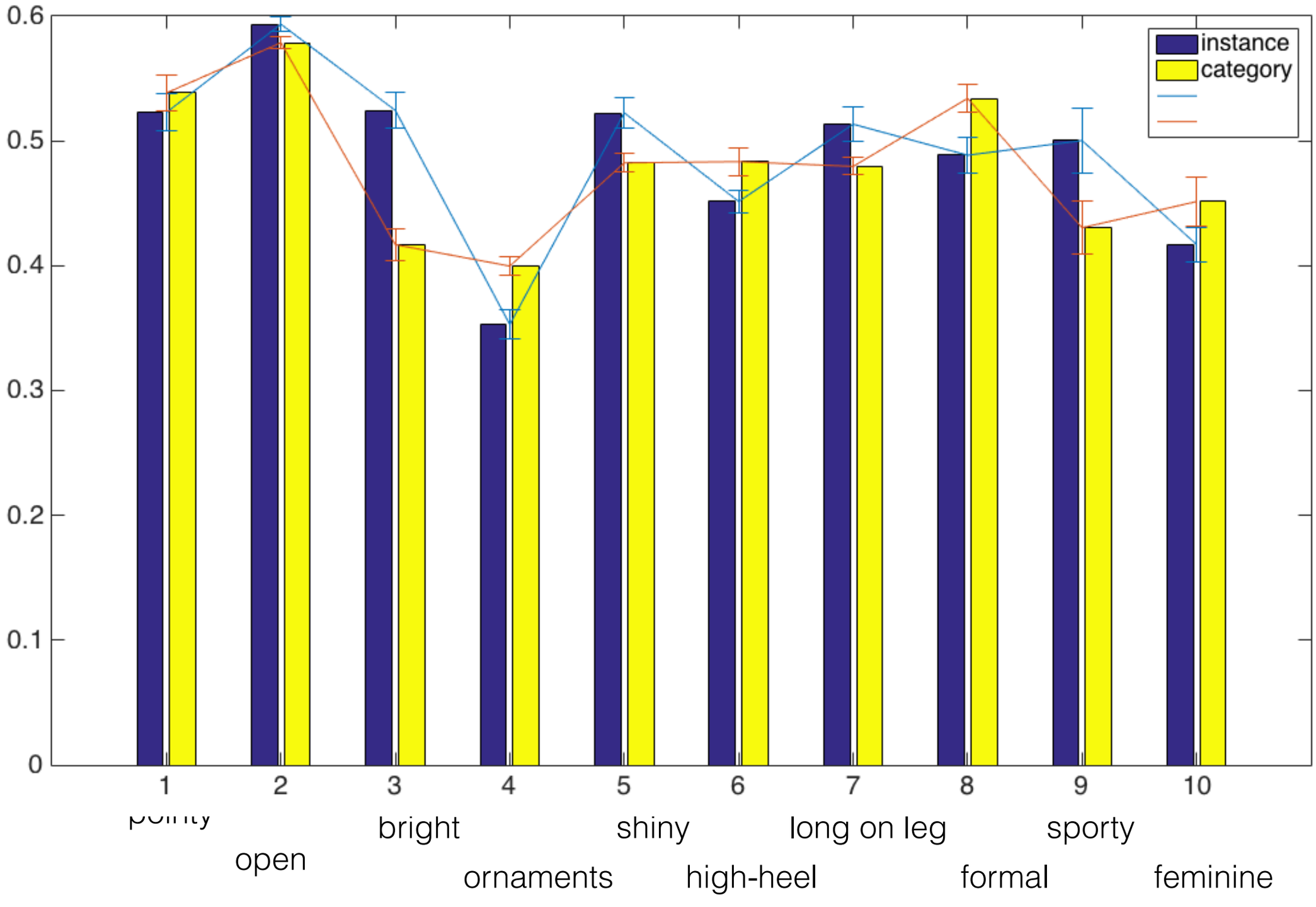
Experiment setup

- Compare results using instance-level with using category-level on:

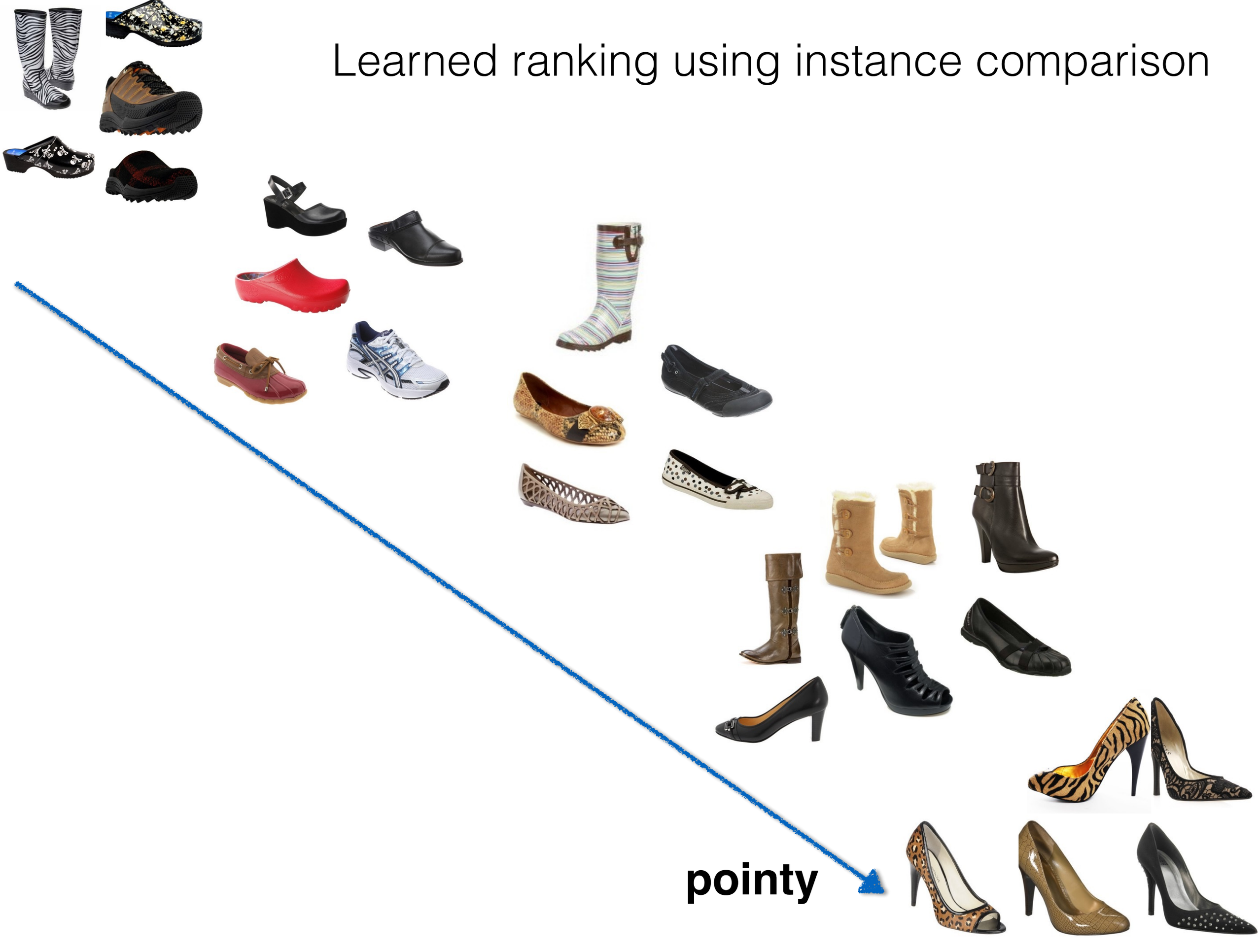
- Image pair order accuracy

- zero-shot learning accuracy

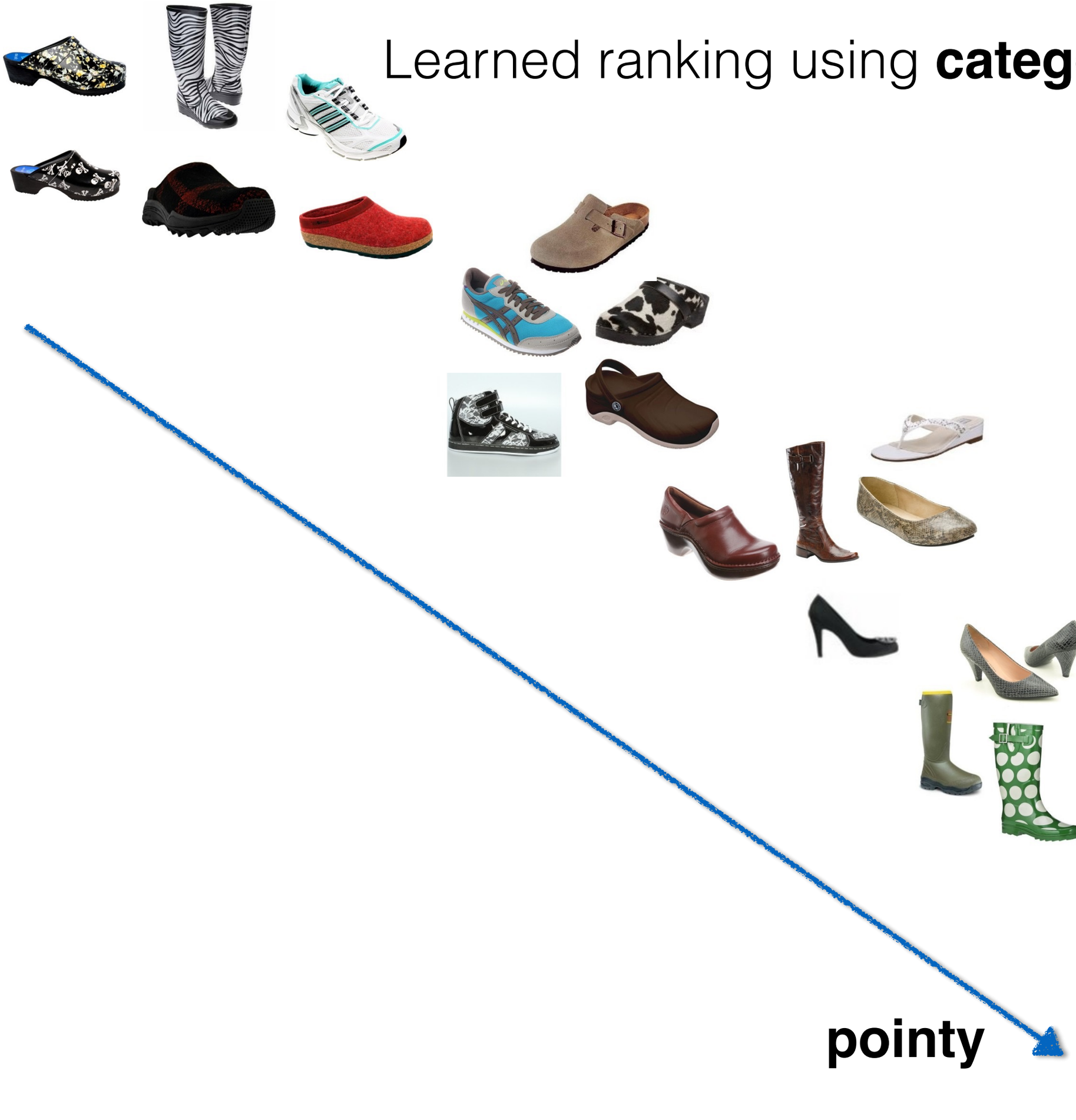
Image pair order accuracy



Learned ranking using instance comparison



Learned ranking using **category comparison**

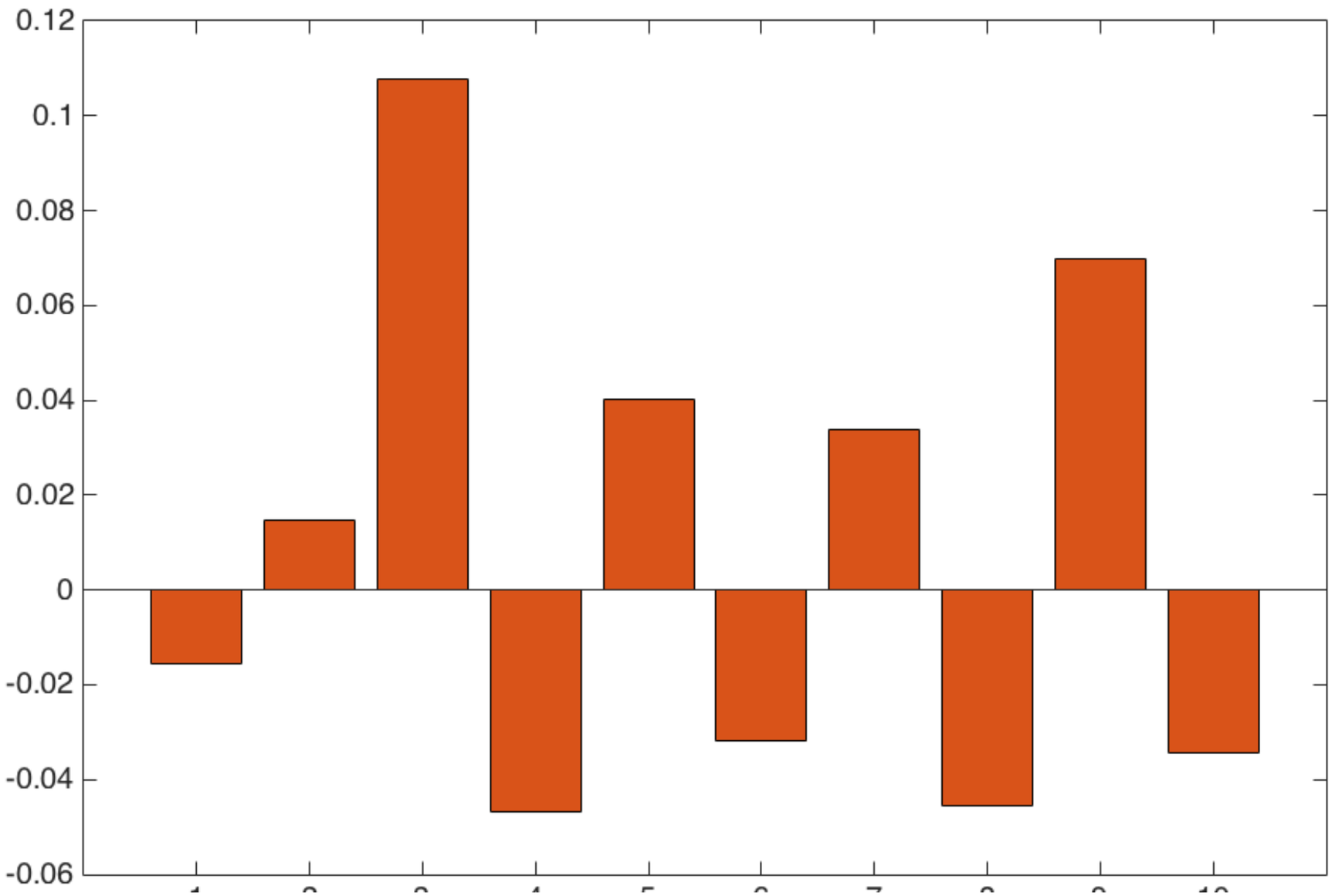


Instance

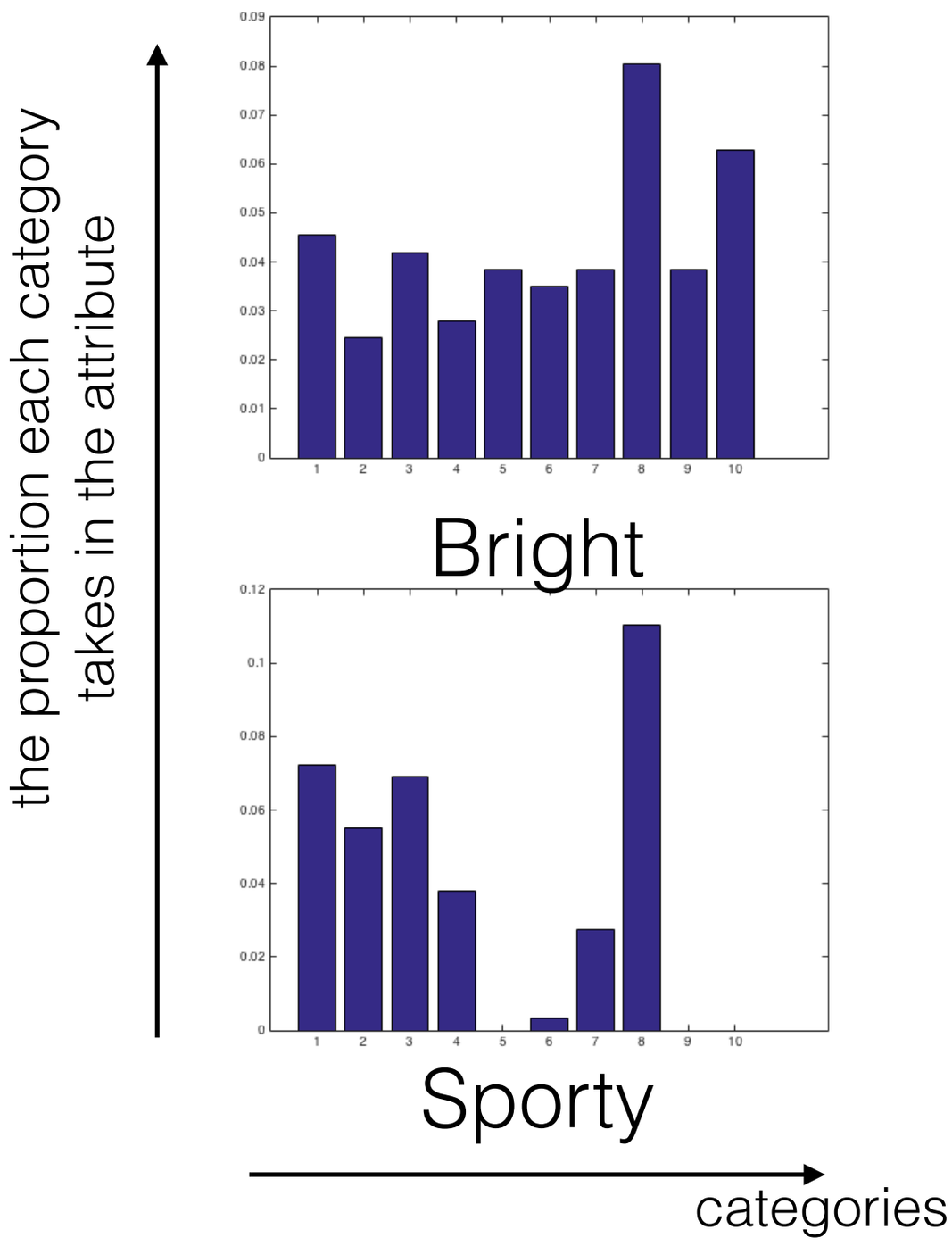
pointy

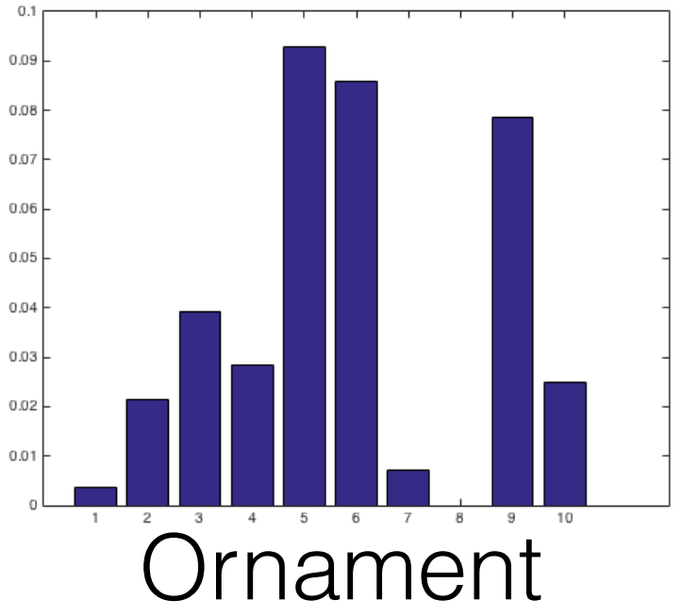
Category

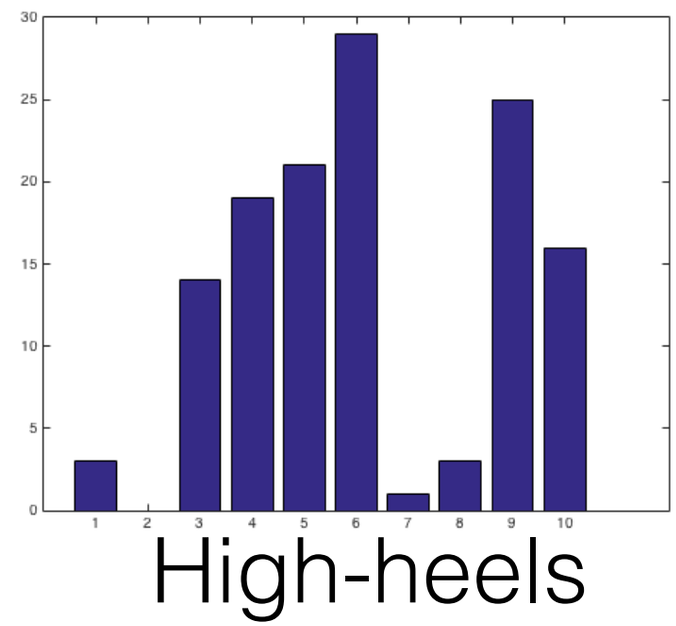
Improvements made by instance comparison



Instance-level information helps most when there isn't a clear category ranking within an attribute







Zero-shot learning accuracy

Zero-shot classification

Guidance/Dataset	Shoes	OSR
Category	0.3423	0.5391
Instance	**0.3826**	*0.5409*

Classification on all seen categories

Guidance/Dataset	Shoes	OSR
Category	0.3665	0.6205
Instance	**0.3825**	**0.6846**

Category-level, prediction on all seen categories

true class

athletic shoes 1
boots 2
clogs 3
flats 4
high heels 5
pumps 6
rainboots 7
sneakers 8
stiletto 9
wedding shoes 10

1 2 3 4 5 6 7 8 9 10

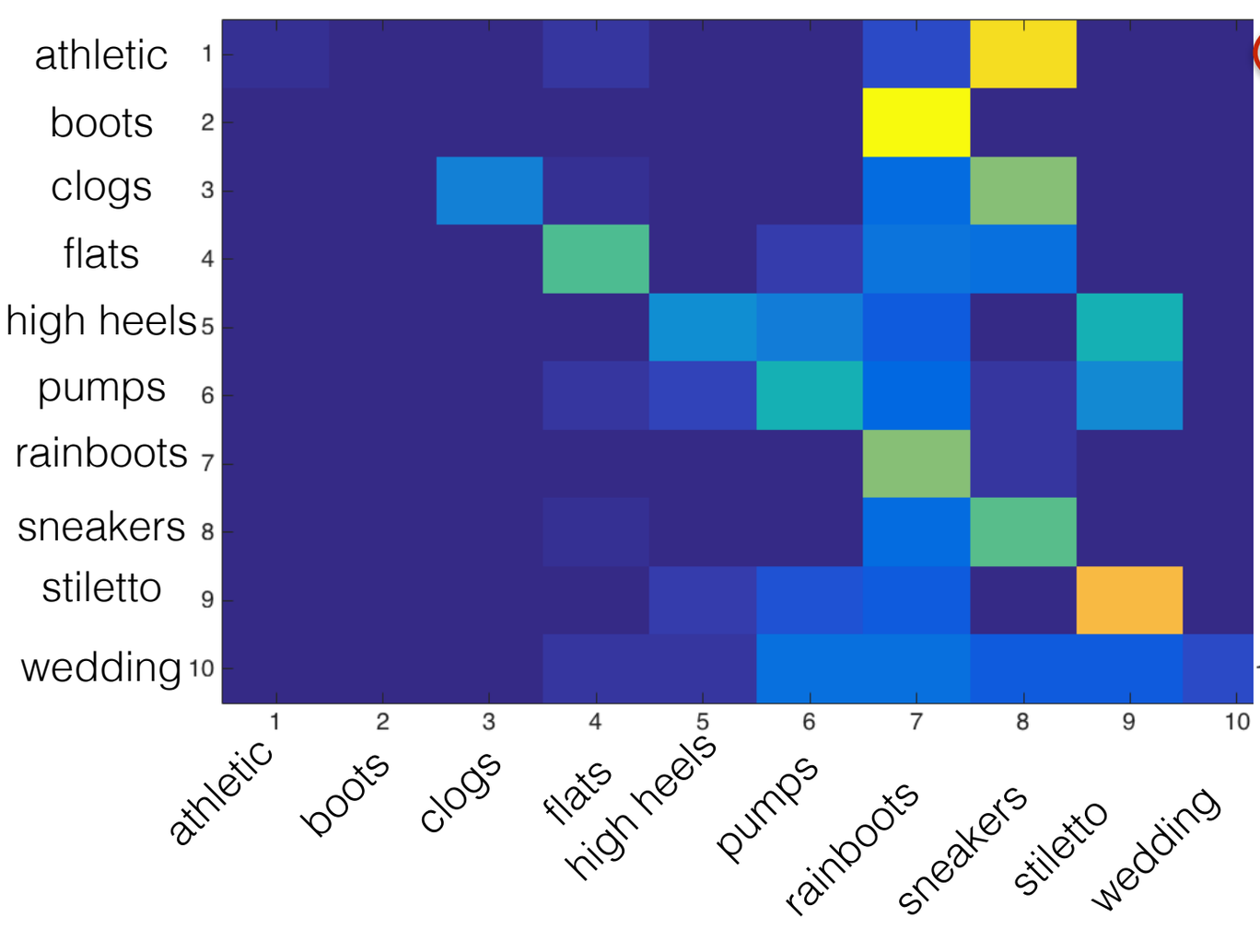
1500
1000
500
0

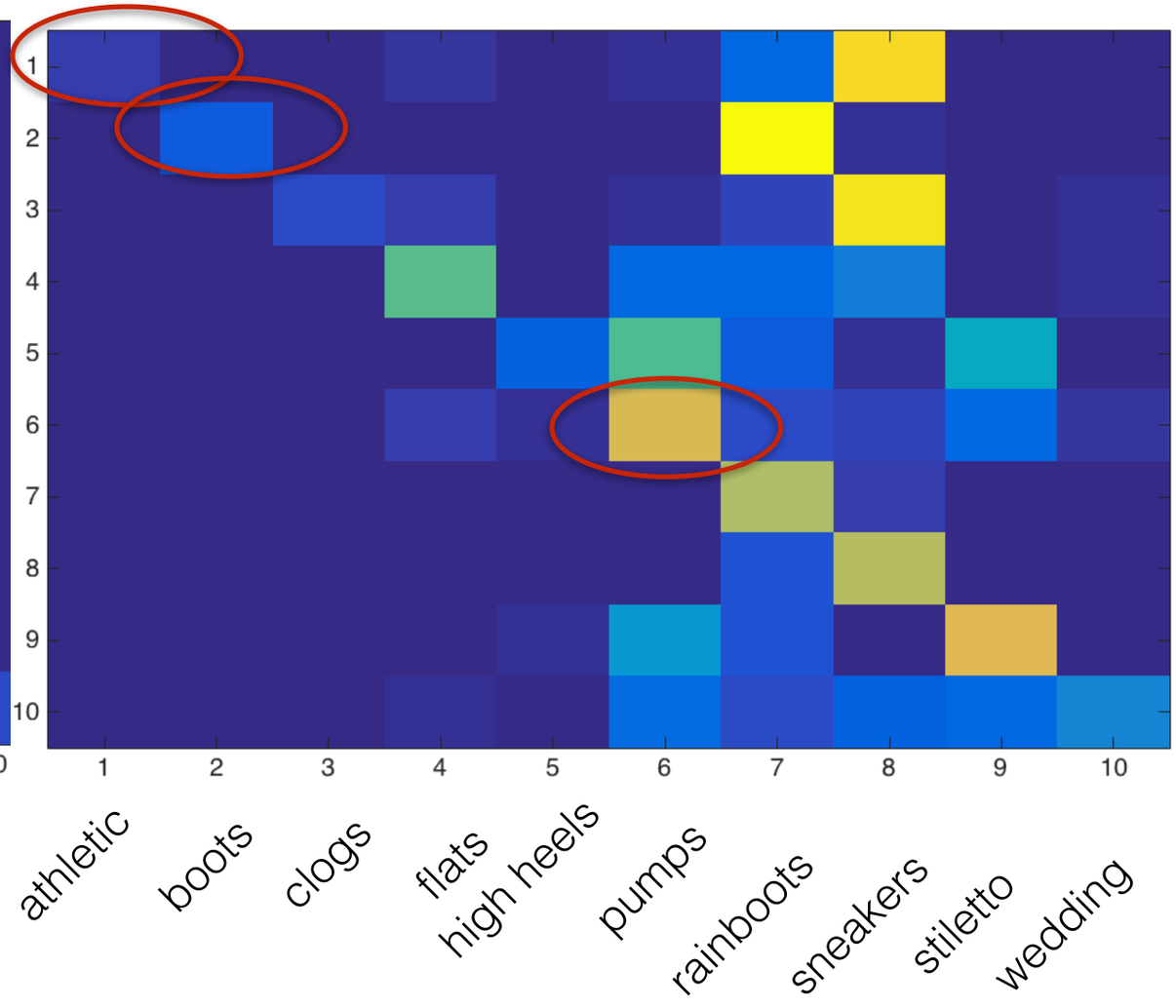
predicted class

Classification results when all classes seen

category

instance





Guidance/Dataset	Shoes
Category	0.3665
Instance	**0.3825**

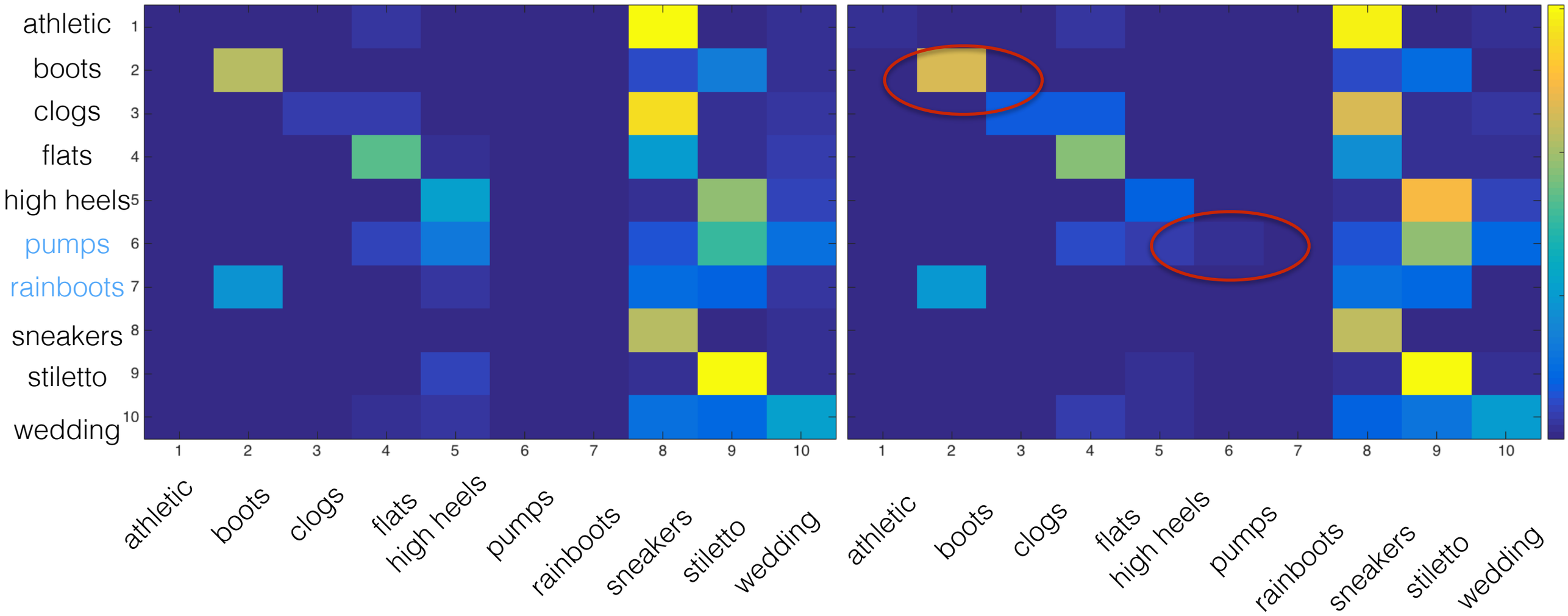
Unable to distinguish athletic/sneaker, boots/rainboots because category comparison too similar

Attribute/Class	Athletic	Boots	Clogs	Flats	Heels	Pumps	Rain Boots	Sneakers	Stiletto	Wedding
Pointy at the front	2	6	3	5	10	9	4	1	8	7
Open	3	2	8	5	7	[illegible]	1	4	9	10
Bright in color	6	1	2	8	4	3	10	7	9	5
Covered w/ ornaments	4	9	6	[illegible]	8	7	1	3	10	2
Shiny	2	9	4	3	6	[illegible]	8	1	10	7
High at the heel	4	6	5	1	9	8	3	2	10	7
Long on the leg	7	9	2	[illegible]	6	5	10	8	4	1
Formal	3	6	4	7	9	8	1	2	5	10
Sporty	10	5	6	7	4	3	8	9	1	2
Feminine	1	6	4	5	10	9	3	2	8	7

Classification results when **pumps, rain boots unseen**

category

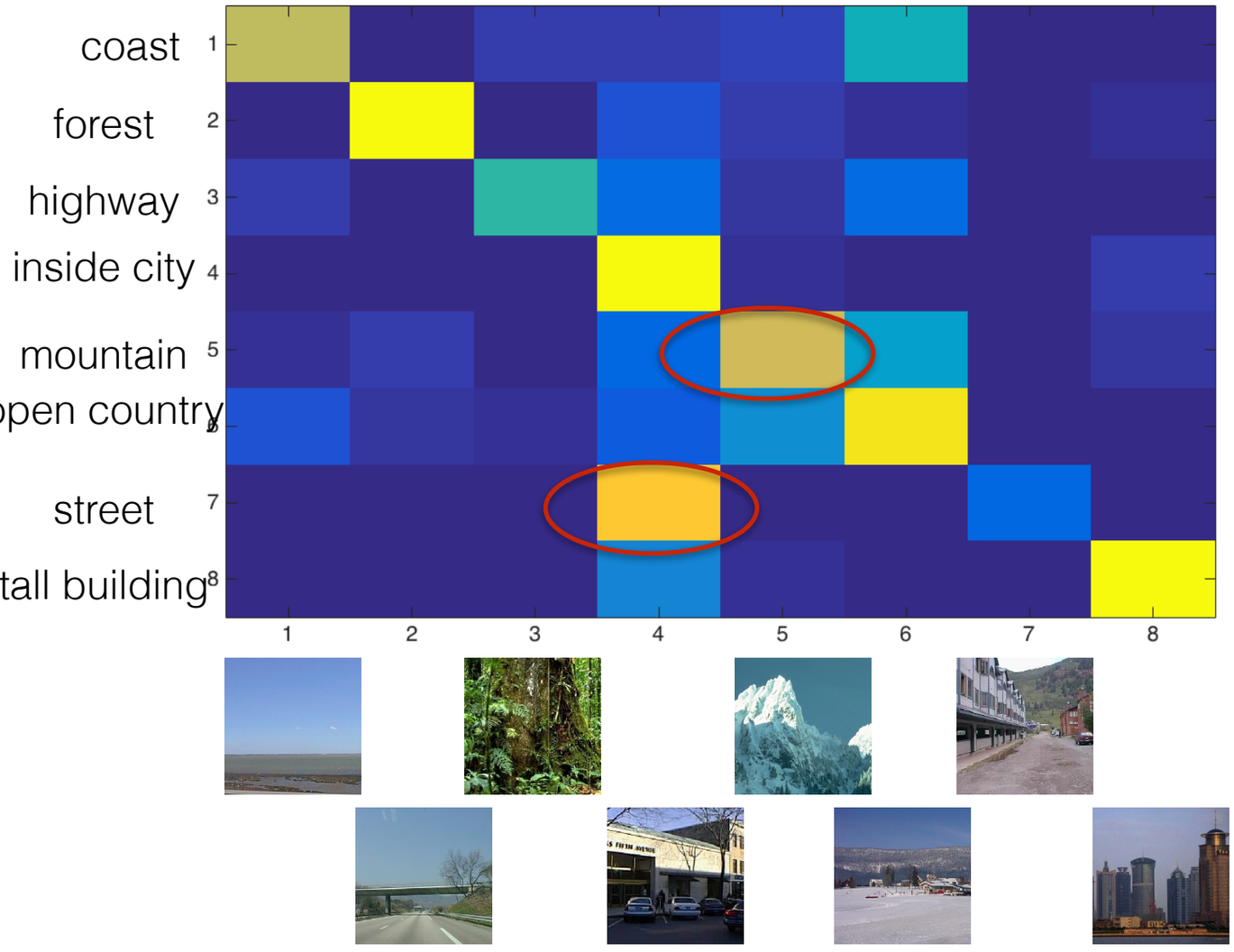
instance



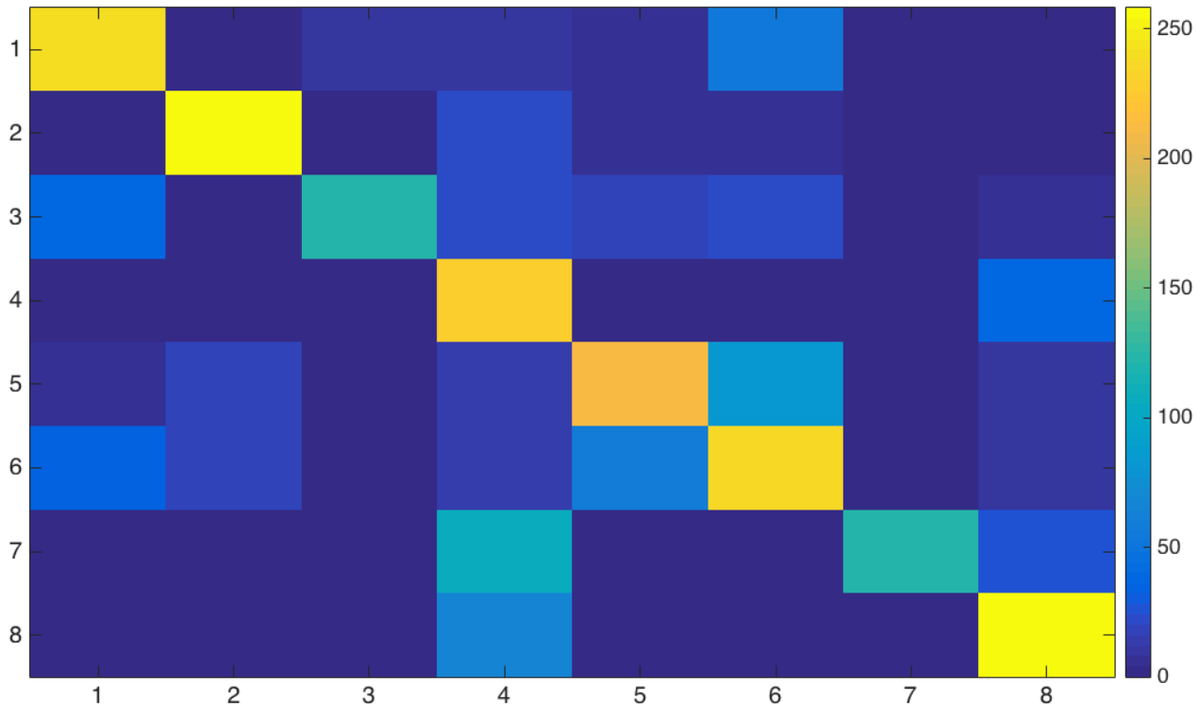
Guidance/Dataset	Shoes
Category	0.3423
Instance	**0.3826**

Classification results when all categories seen

category



instance

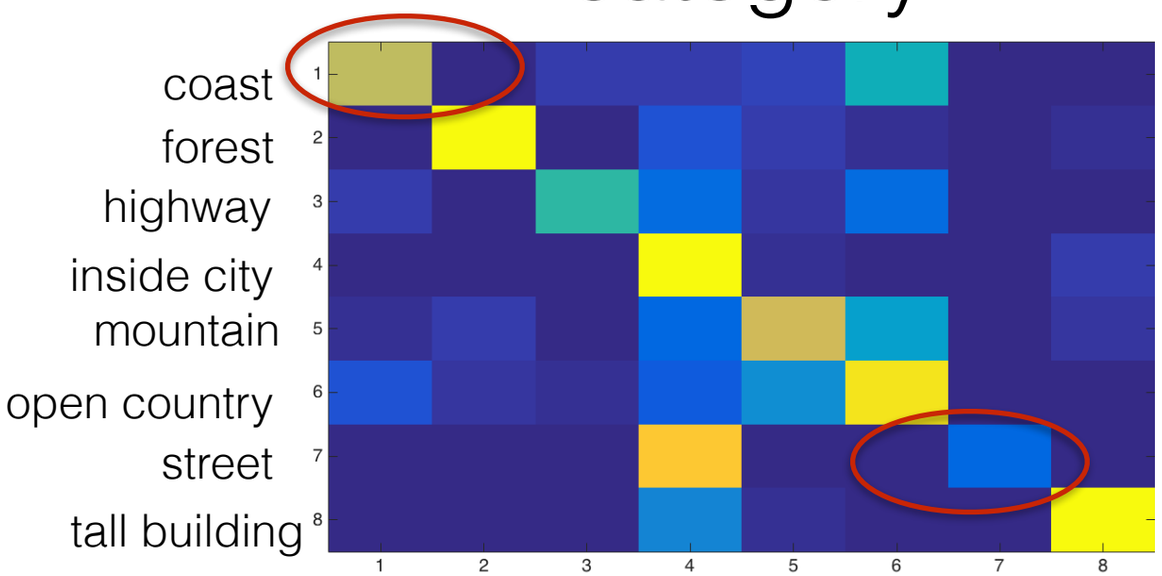


Guidance/Dataset	OSR
Category	0.6205
Instance	**0.6846**

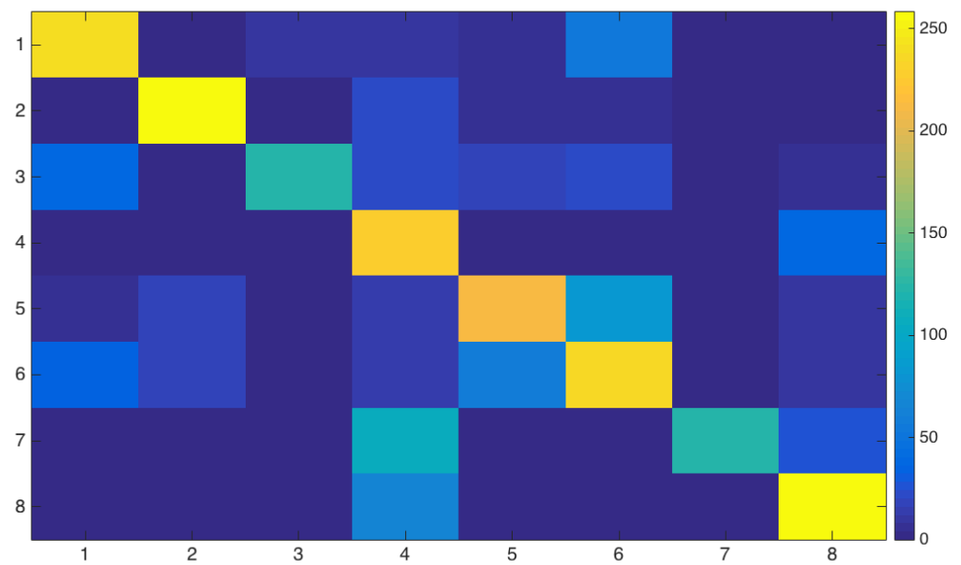
Attribute/ Class	Coast	Forest	Highway	Inside City	Mountain	Open country	Street	Tall building
Natural	1	1	5	6	1	1	6	8
Open	1	7	1	6	4	1	5	7
Perspective	7	5	4	3	6	8	2	1
Large objects	2	8	2	4	6	6	4	1
Diagonal plane	5	8	2	3	6	6	3	1
Close depth	8	1	1	1	7	6	1	5

Classification results when all categories seen

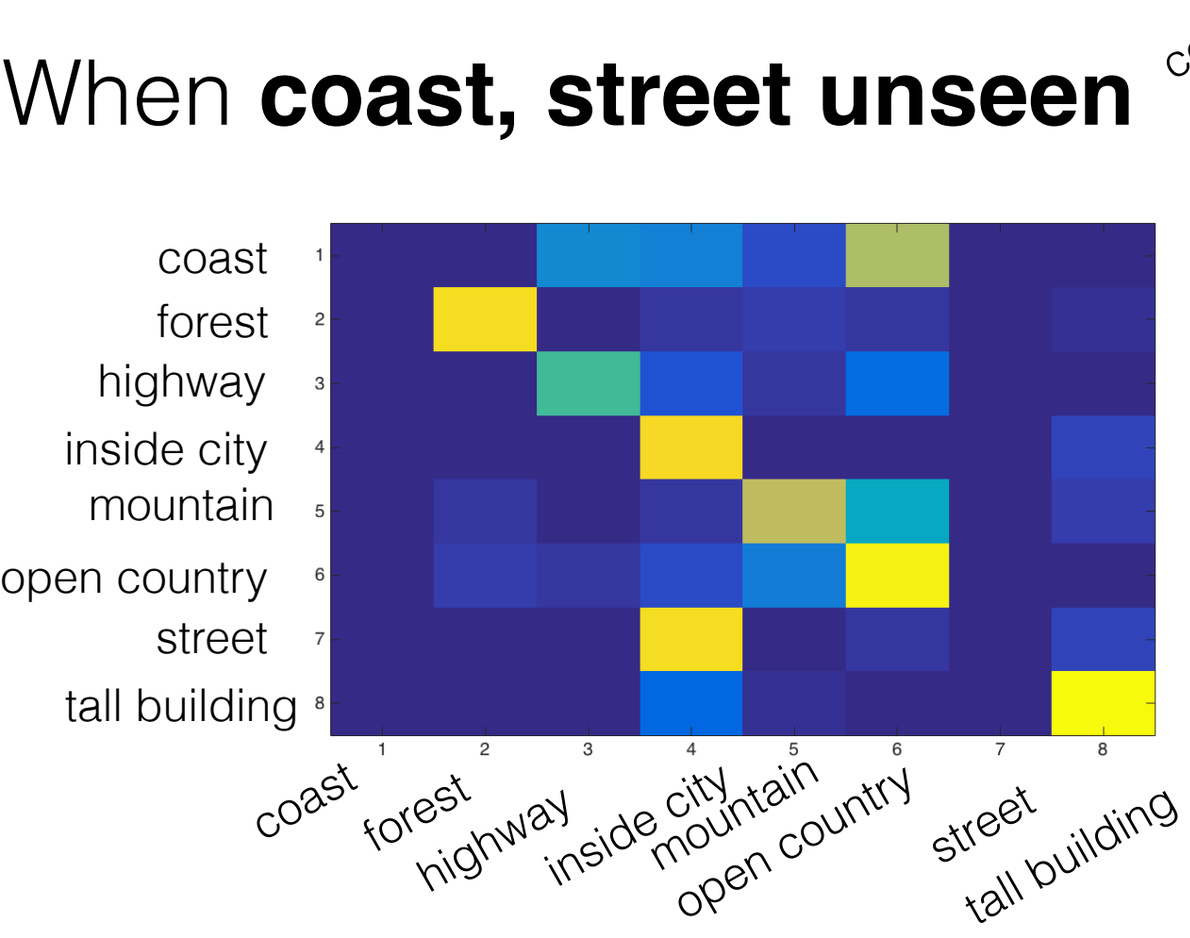
category

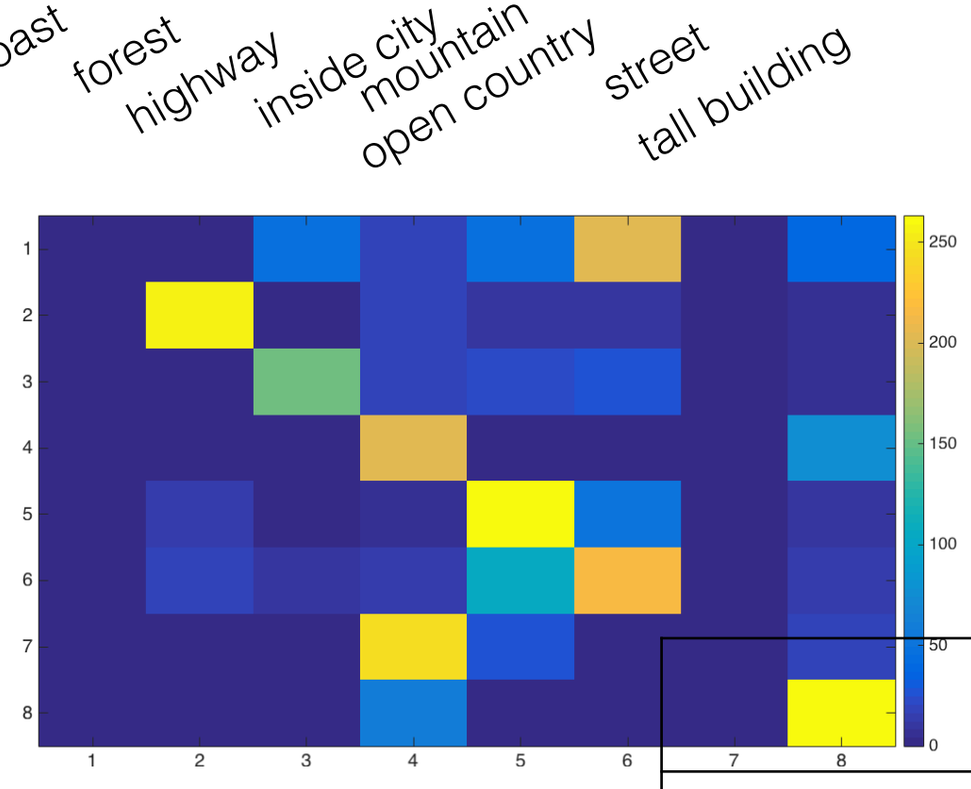


instance



When **coast, street unseen**



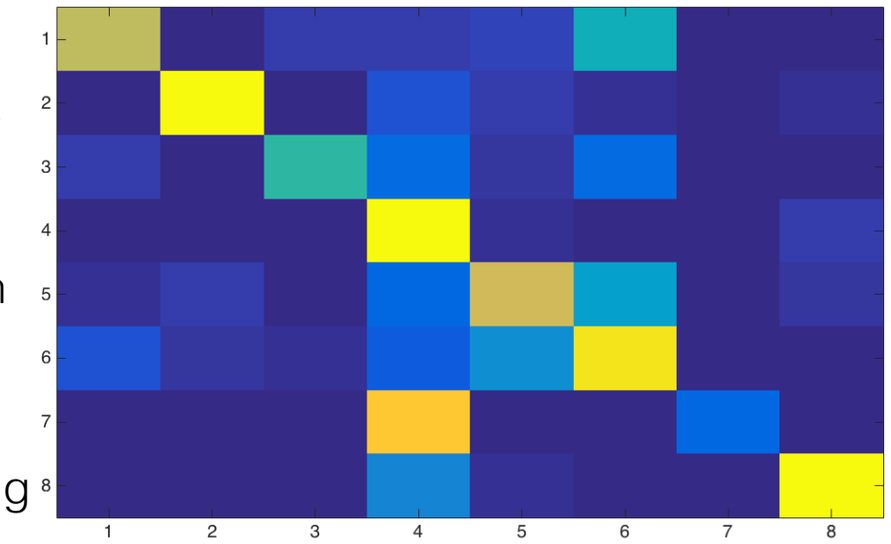


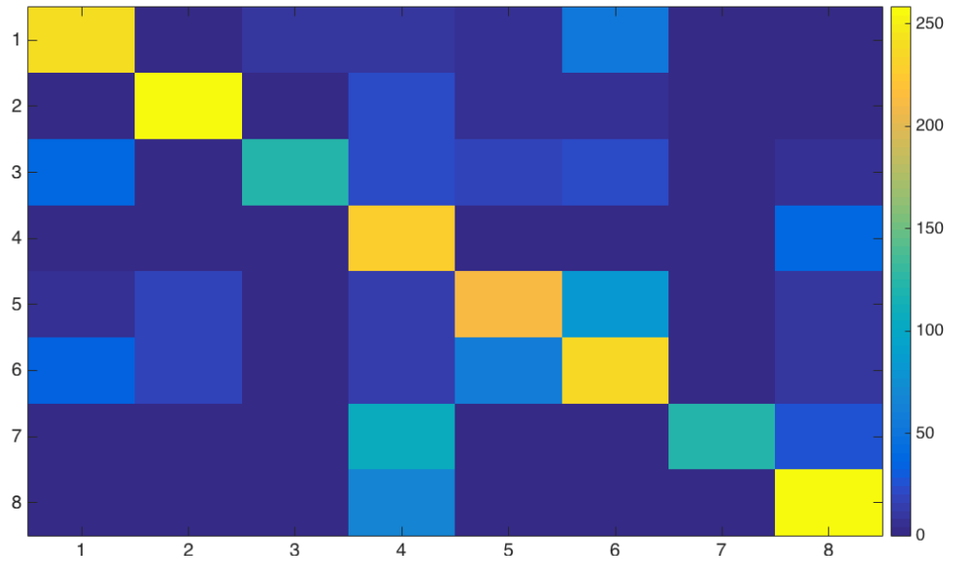
	OSR
Category	0.5391
Instance	*0.5409*

category

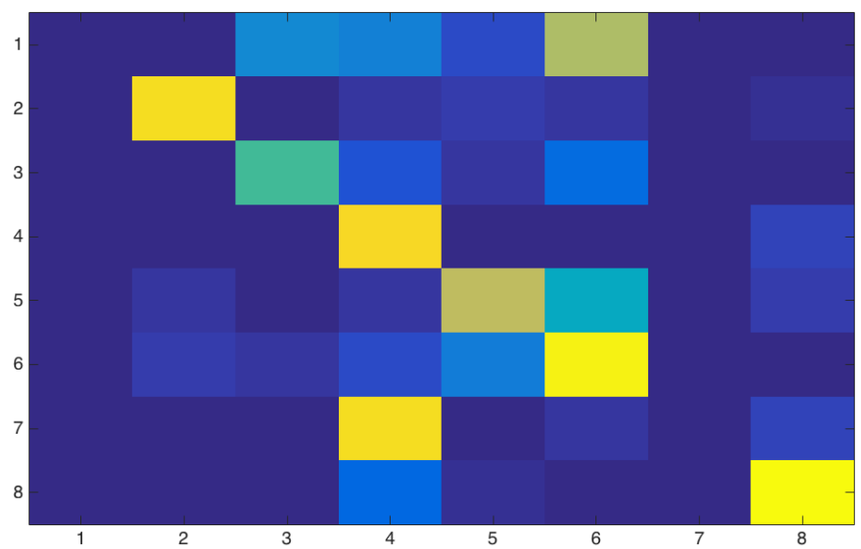
instance

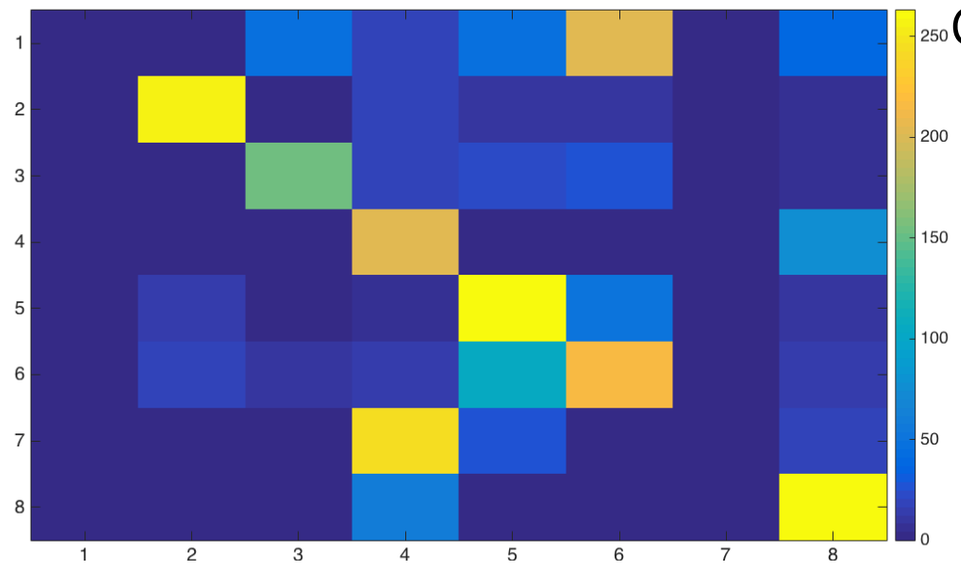
coast
forest
highway
inside city
mountain
open country
street
tall building



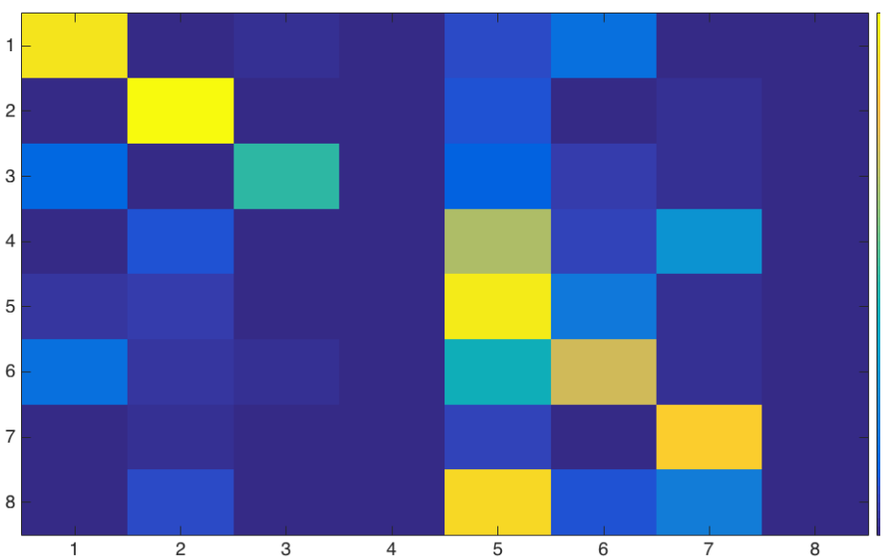


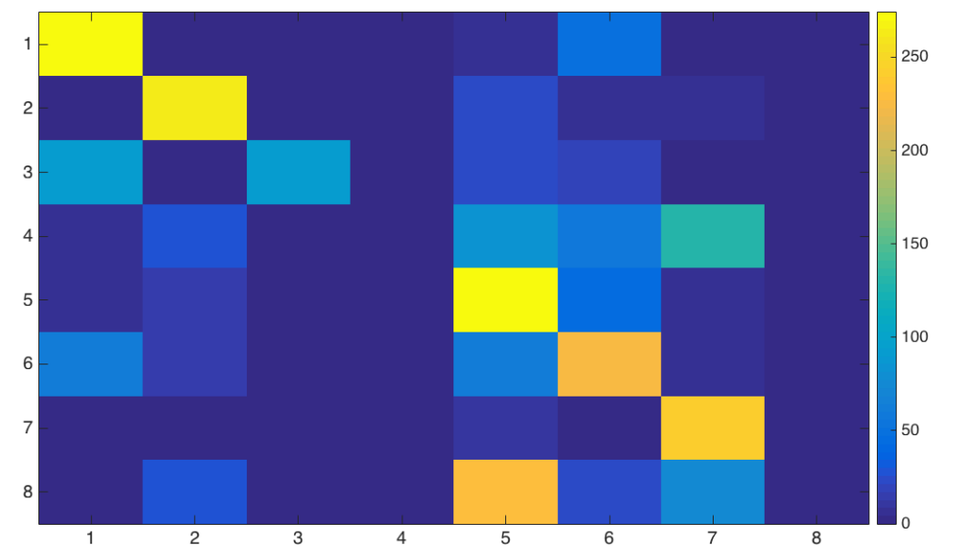
all seen





coast, street unseen





inside city, tall building unseen

Conclusion

- Instance-level information in general helps classification between two very similar classes.

- Instance-level helps more when the classification task is more fine-grained.

Demo

http://godel.ece.vt.edu/whittle/

https://filebox.ece.vt.edu/~parikh/demos.htm#whittle_demo