Relative Attributes

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Experiment Presentation
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Motivation

Sometimes it is hard to make a binary decision on whether an image satisfies an attribute. Comparisons are easier.

Image Source: https://filebox.ece.vt.edu/~parikh/relative.html

Sources

Code and data for following experiments obtained from :
https://filebox.ece.vt.edu/~parikh/relative.html#code

Pubfig dataset

- Public Figures Face Database - Images of famous public figures
- Images of the same person are grouped into categories
- Attributes - Male, White, Young, Smiling, Chubby, VisibleForehead, BushyEyebrows, NarrowEyes, PointyNose, BigLips, RoundFace

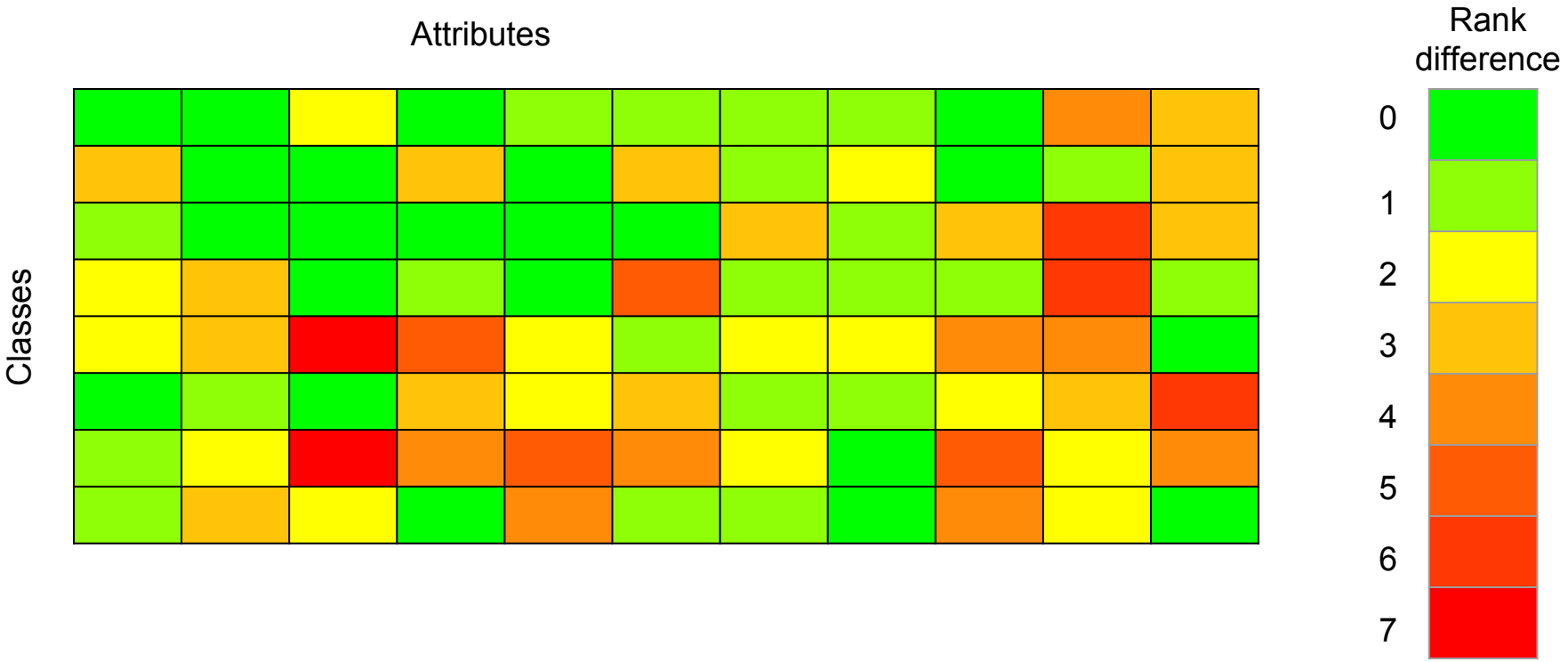
Ground Truth - Ordering of categories for each attribute

	Attr1	Attr2	Attr3	Attr4
Class1	1	2	3	3
Class2	2	1	1	1
Class3	3	3	2	2

Evaluating Ranking

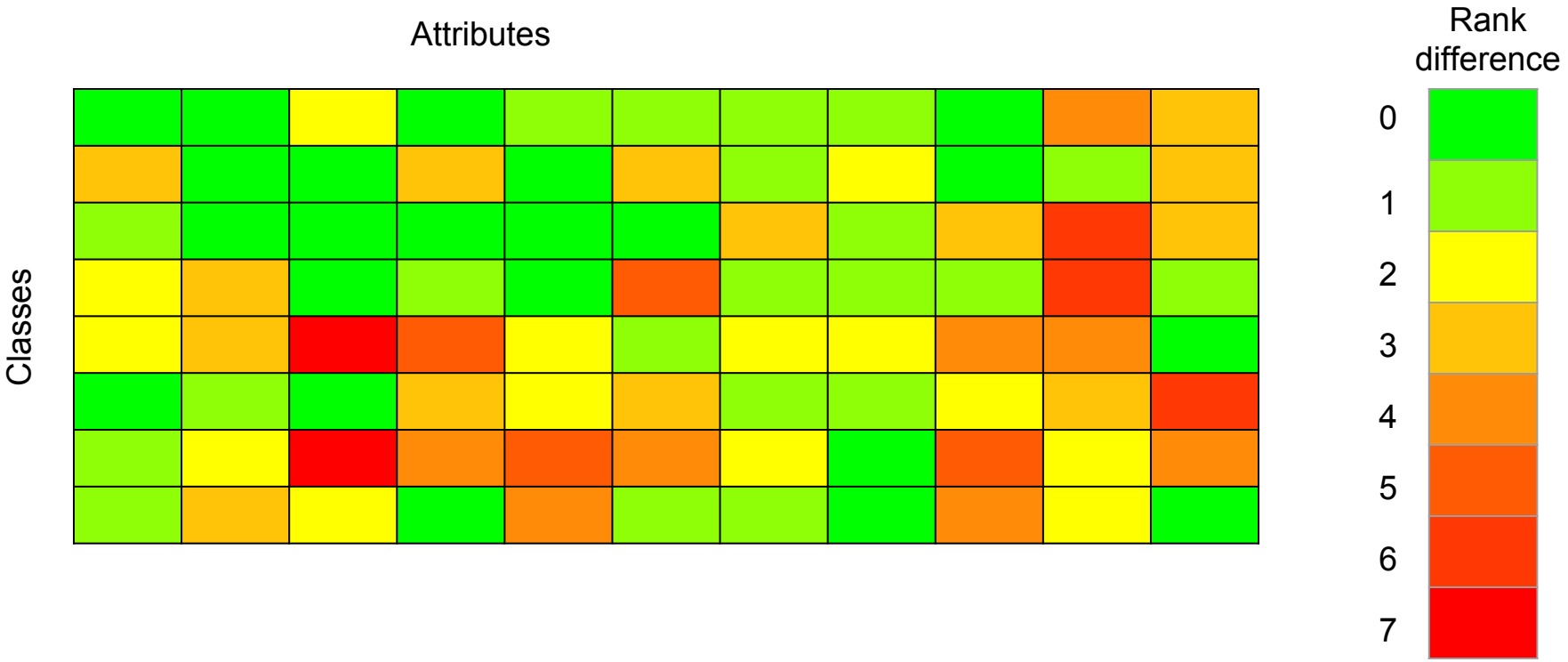
- → Obtain training pairs using category ranking
- → Train SVM to get a score for each image
- → Average scores of images in category to get score of category
- → Rank categories accoridng to this score
- → Compare to ground truth ranking

Ranking Prediction

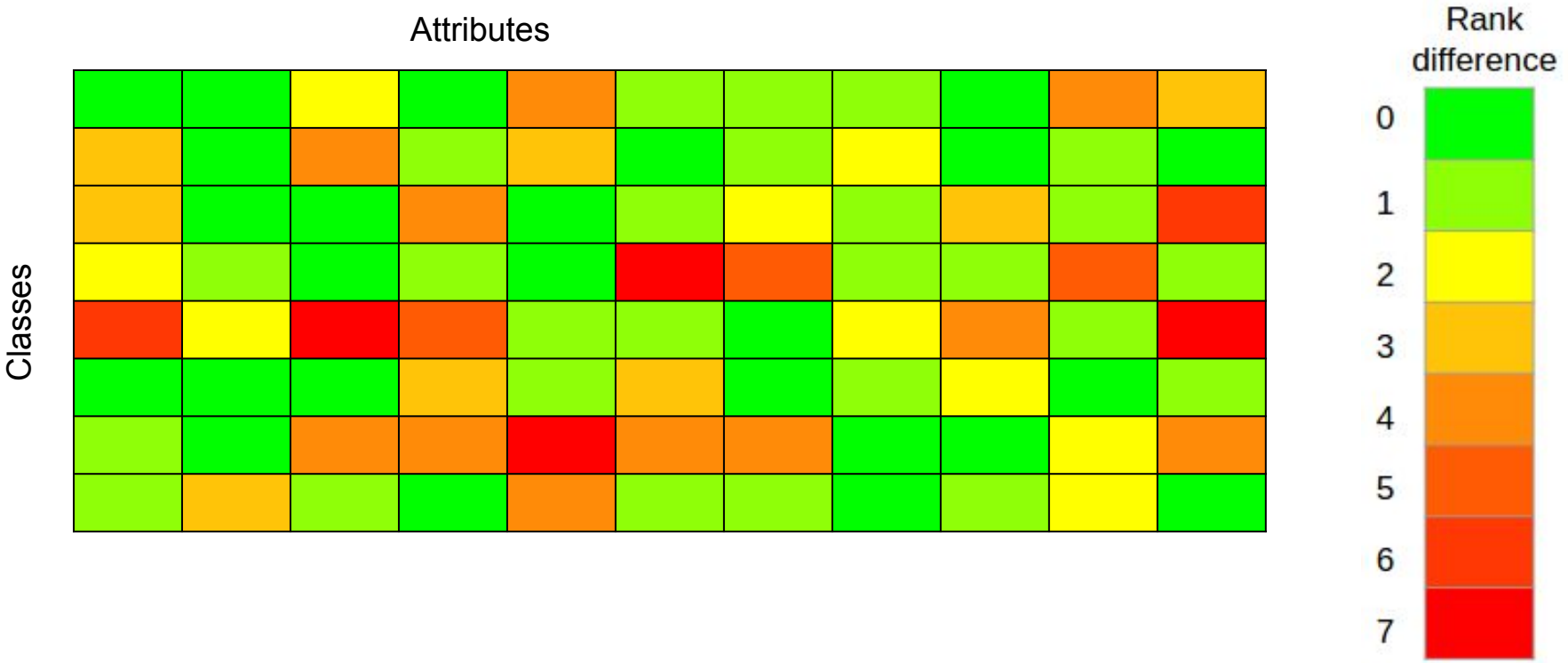


Varying the amount of training data

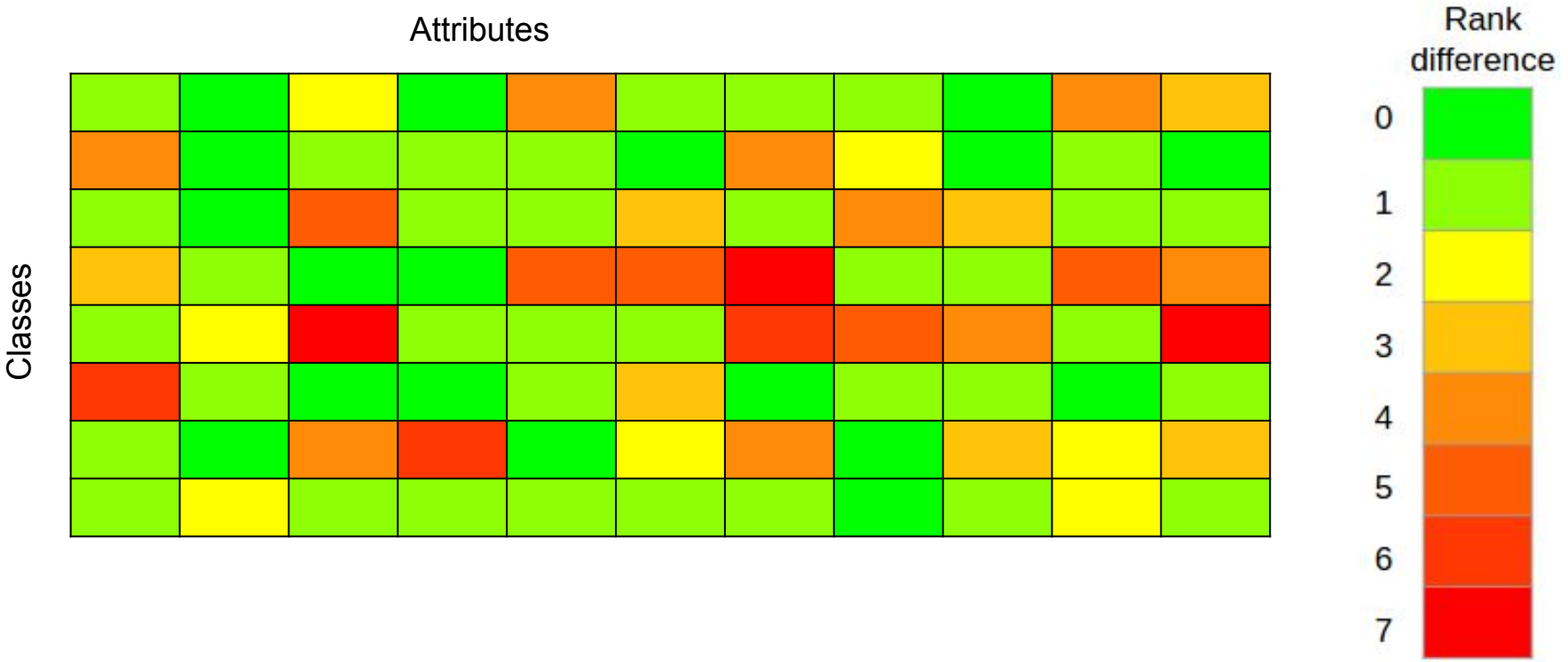
With original amount of training data



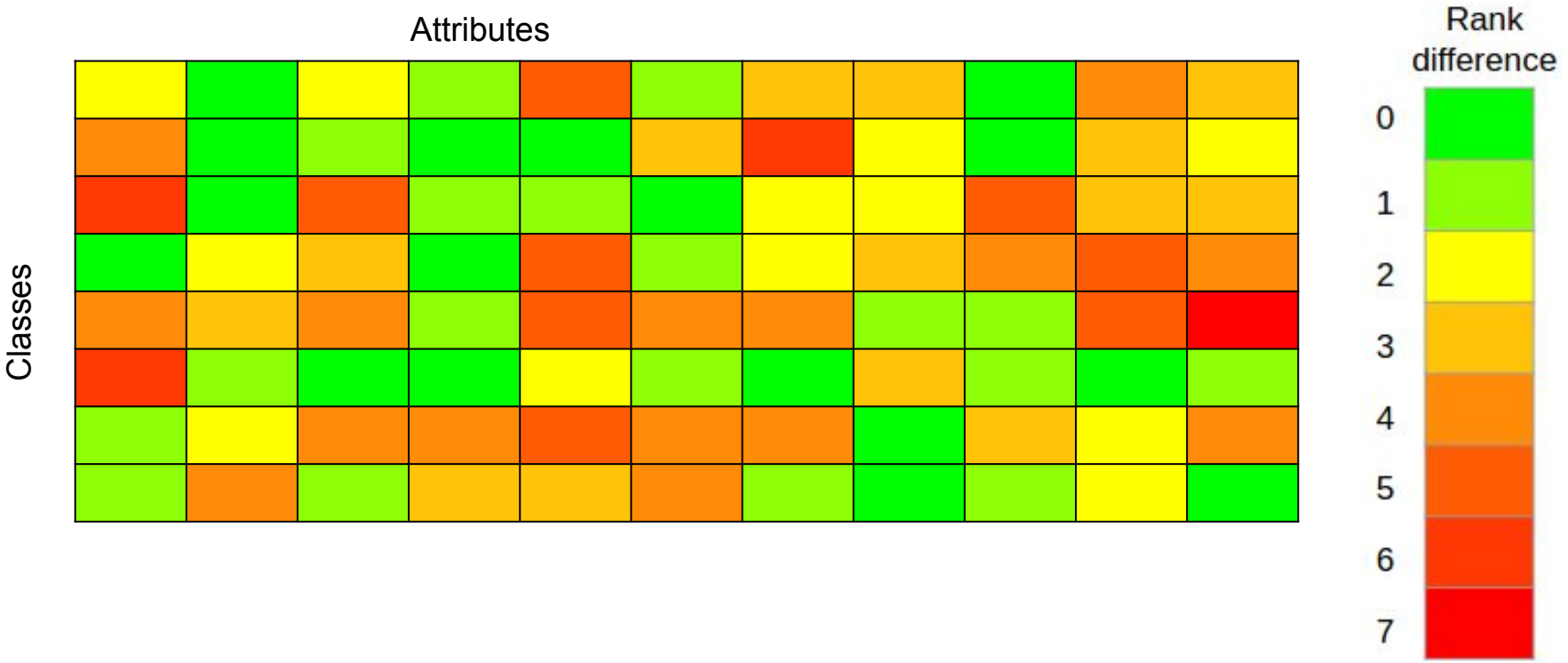
With 80% of original training data



With 60% of original training data



With 40% of original training data



What sort of mistakes does it make?

Failure cases - Who has bigger lips?

Failure cases - Who has bigger lips?

Supposed to be the person on the right but certain expressions don’t indicate this.

Failure cases - Who looks younger?

Failure cases - Who looks younger?

Supposed to be the girl on the right. Other images are more obvious but expression, make-up and lighting affect this.

Instance Level Supervision vs Category Level Supervision

WhittleSearch Dataset

- → Collected by: Adriana Kovashka, Devi Parikh, and Kristen Grauman
- → Publication: Whittle Search: Image Search with Relative Attribute Feedback, in CVPR 2012
- → Dataset of shoes: 14658 images
- → Provide extracted features (GIST and colour - LAB histogram), accounting for image orientation

WhittleSearch Dataset

- → Category level ordering and instance level comparisons for each attribute
- → Attributes: pointy-at-the-front, open, bright-in-color, covered-with-ornaments, shiny, high-at-the-heel, long-on-the-leg, formal, sporty, feminine
- → Instance level ordering obtained via MTurk

Examples

Women’s Boots



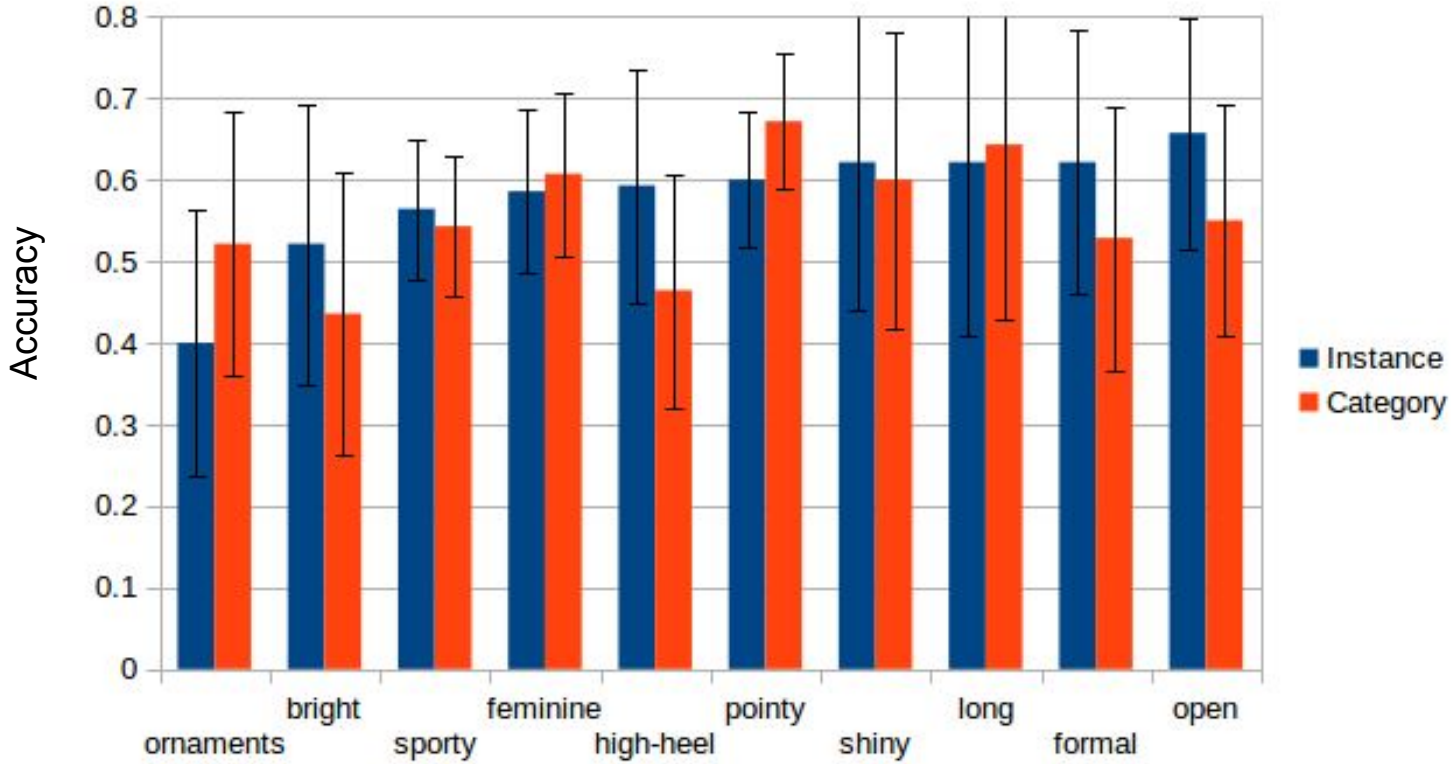

Women’s flats




Women’s stiletto




Instance level supervision vs category level supervision



Why does training on category level information do well sometimes?

- List of categories - athletic_shoes, boots, clogs, flats, high_heels, pumps, rain_boots, sneakers, stiletto, wedding_shoes
- Pointy, ornaments, long on the leg seem to be attributes that we can associate with some of these classes
- Possibly category level labels result in more well-separated data, making it easier to train an SVM (SVMs are sensitive to noise near the support vectors)

Some cases where the prediction differs

More Sporty: Ground truth - left; Instance based - left; Category based - right

Some cases where the prediction differs

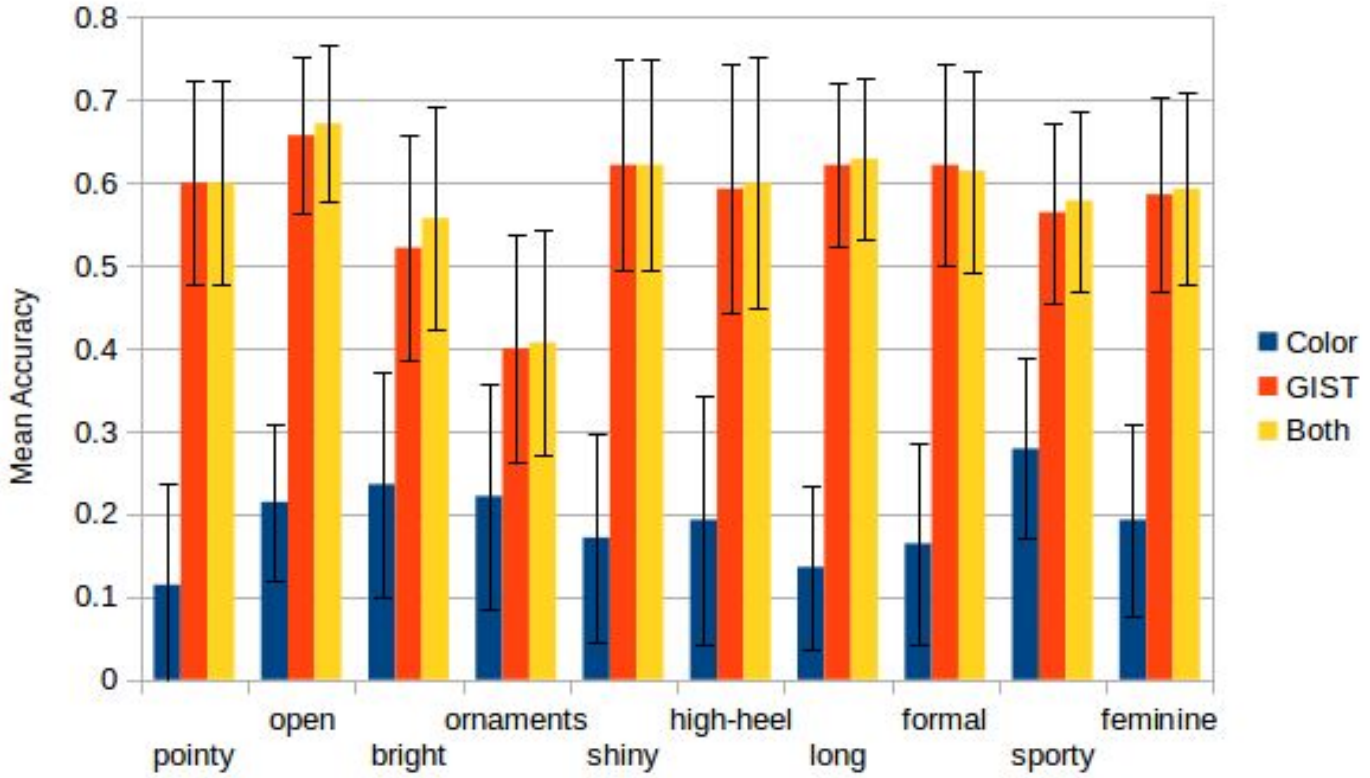
More Sporty: Ground truth - left; Instance based - right; Category based - left

Some cases where the prediction differs

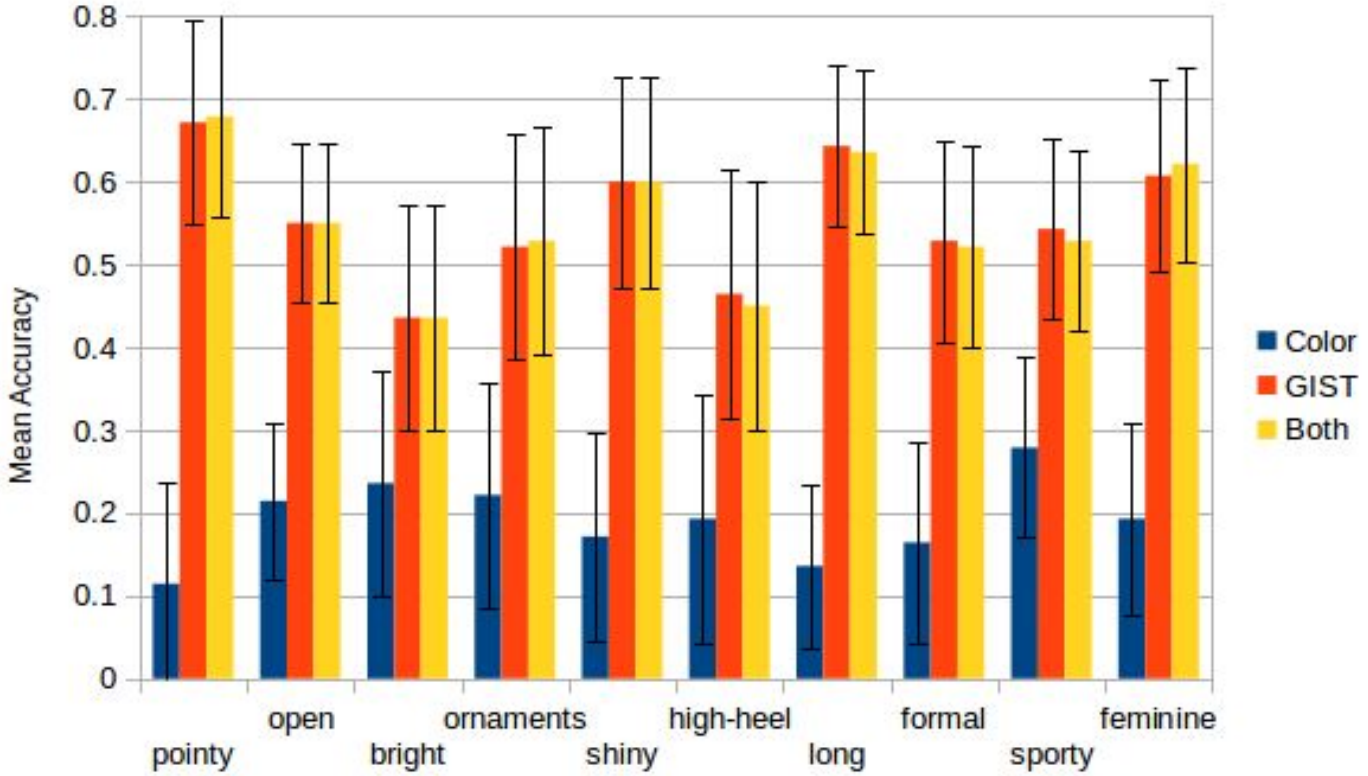
More Sporty: Ground truth - equal; Instance based - right; Category based - left

Usefulness of different types of features

Comparing GIST and colour features - instance comparisons



Comparing GIST and colour features - category comparisons



Where GIST and the combination differ

More Bright: Ground truth - right; GIST - equal; Both - right

Where GIST and the combination differ

More Bright: Ground truth - left; GIST - equal; Both - right

Where colour and the combination differ

More Bright: Ground truth - right; Colour - equal; Both - right

Where colour and the combination differ

More Bright: Ground truth - equal; Colour - equal; Both - left

Relative Descriptions

Relative Descriptions

Relative Descriptions - Pointy at the front

Relative Descriptions - open

Relative Descriptions - bright in colour

Relative Descriptions - covered in ornaments

Relative Descriptions - shiny

Relative Descriptions - high at the heel

Relative Descriptions - long on the leg

Relative Descriptions - formal

Relative Descriptions - sporty

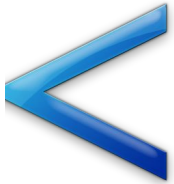
Relative Descriptions - feminine

Varying the number of images in between

Leave 1/16 of the images in between (formal)

Leave 1/8 of the images in between (formal)

Leave 1/4 of the images in between (formal)



Leave 1/2 of the images in between (formal)

Thank You!