Rule of Thirds and Simplicity for Image Aesthetics using Deep Neural Networks

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Code: `https://bit.ly/2Yy18mw`

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Motivation

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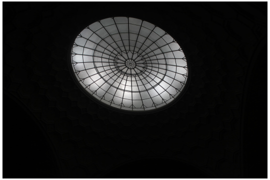
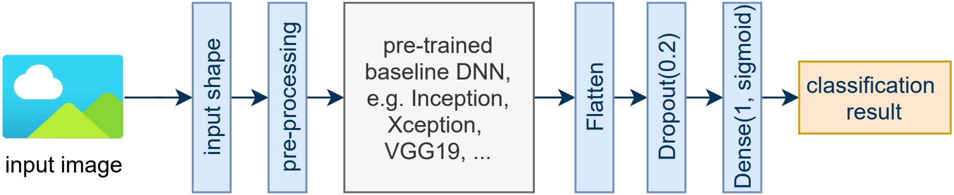
  

- increasing upload of photos to social media platforms
- such photos not necessarily all of high appeal
- photo rules to increase appeal, e.g. rule of thirds, simplicity, balancing elements, and more [7]
- prediction whether a photo follows: rules of third, or image simplicity

  → How to automatically predict usage of photo rules?

Our Approach



- re-training/fine-tuning of pre-trained DNNs (17 different baseline models)
- for each rule: one model for a binary classification
- alternative:
  - rule prediction: [12, 11, 1]
  - prediction of overall appeal score: [4, 15, 3, 13, 10, 9, 2, 14, 8];
  - overall score: still challenging [16, 6]

Evaluation- rule of thirds

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- dataset: Flickr urls [12]; 1808 "negative"; 1838 "positive"
- 90%-10% training validation split; 200 epochs, best reported

model	*accuracy*	*precision*	*recall*	*f1*	*mcc*
ResNet152	0.841	0.835	0.862	0.848	0.681
MobileNet	0.827	0.821	0.851	0.836	0.654
ResNet50	0.827	0.824	0.846	0.835	0.653

Table: **rule of thirds** prediction for top-3 DNN baseline models.

- better performance than *Mai et al.* [12] (80% accuracy)

Evaluation- image simplicity

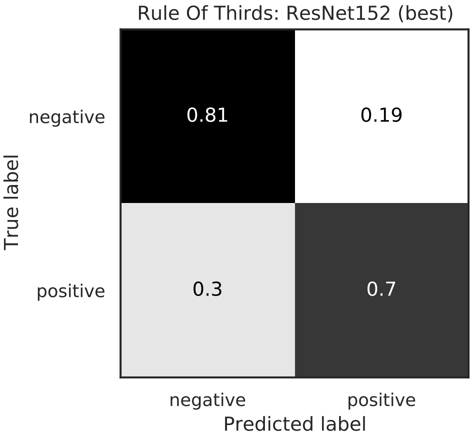
- dataset: urls [11]; 1832 “true"; 1980 “false".
- 90%-10% training validation split; 200 epochs, best reported

model	*accuracy*	*precision*	*recall*	*f1*	*mcc*
DenseNet121	0.940	0.952	0.927	0.939	0.880
ResNet50	0.934	0.941	0.927	0.934	0.869
VGG19	0.934	0.941	0.927	0.934	0.869

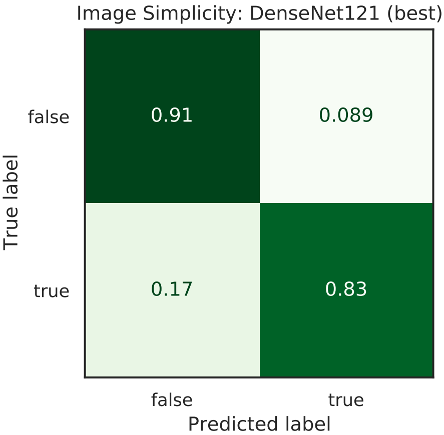
Table: **image simplicity** prediction for top-3 DNNs.

- better performance than *Mai et al.* [11] (89% accuracy)

Evaluation- confusion matrix



(a) Rule of thirds (ResNet152).



(b) Simplicity (DenseNet121).

Figure: Confusion matrices for best performing models considering both rules of thumbs.

Evaluation- AVT-Image-Database

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- 1133 images [5]; extended by 5 annotators for rule of thirds and simplicity

rule	**model**	*accuracy*	*precision*	*recall*	*f1*	*mcc*
rule of thirds	ResNet152	0.672	0.549	0.292	0.381	0.202
image simplicity	DenseNet121	0.794	0.708	0.721	0.714	0.553

Table: performance of prediction in comparison to binary mean annotations.

- both prediction results within range of pairwise comparison of annotators

Conclusion, Summary and Future Work

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- overview of re-trained DNN models for photo rule prediction
  - example rules: rule of thirds, image simplicity
  - DNNs show good results; better than SoA reported values
- additional annotation of AVT-Image-Database
- open and next steps:
  - apply models to other rules
  - handle rules as regression
  - analyze subjective influence for rule annotations

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Thank you for your attention

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. . . . . . are there any questions?

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