Abraia

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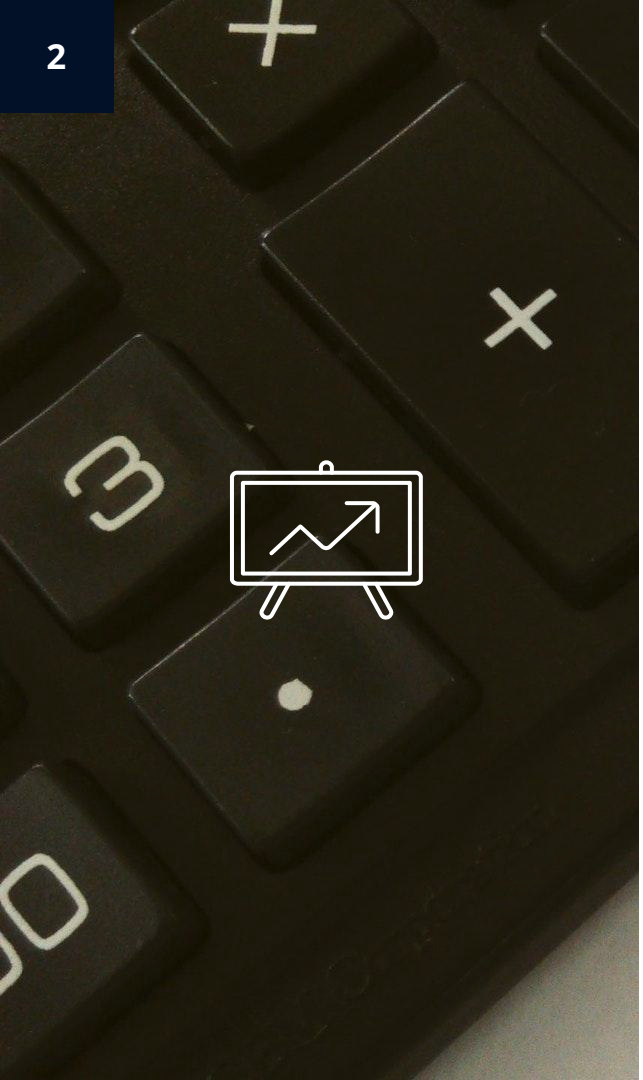
Abraia Software SL

Automatic Image Cropping based on Aesthetics Prediction using CNNs

Perception-inspired tools for the web



Some figures

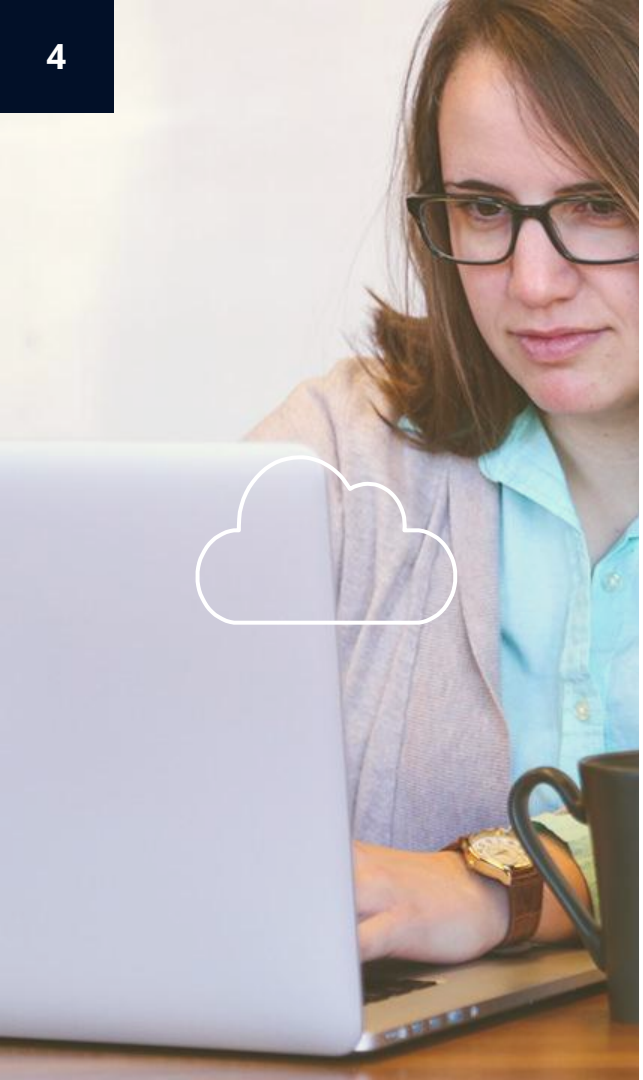
- > 1.25 billion websites
- >51% mobile web visits
- 69% mobile web traffic is images

Responsive web design

The goal is to provide an optimal viewing experience for any display format.

- Adapts the layout to the viewing environment
- Multiple layouts for a range of devices
- Different aspect ratios
  - *Lots of images must be transformed*

Problem: Adapting pictures to different formats is hard



Abraia cloud services

Cloud services to transform and optimize images on-the-fly using simple URLs.

- Smart image retargeting driven by perception
- Retarget image to the many screen formats that enter your site
  - On the fly
  - In your stock
- Easy-to-use API to make a site responsive
- A perfect fit to media and ecommerce sites

Automatic image cropping

Problem

- Adapting images to different displays
- How to crop lots of images to different sizes?

Solution

- Crop and resize
- Smart cropping algorithms

Automatic cropping schemes

Attention-based approaches

Saliency prediction to detect the most relevant content.

Image Content

Aesthetics-based approaches

Photographic rules to balance the composition.

Image Composition

Content & Aesthetics

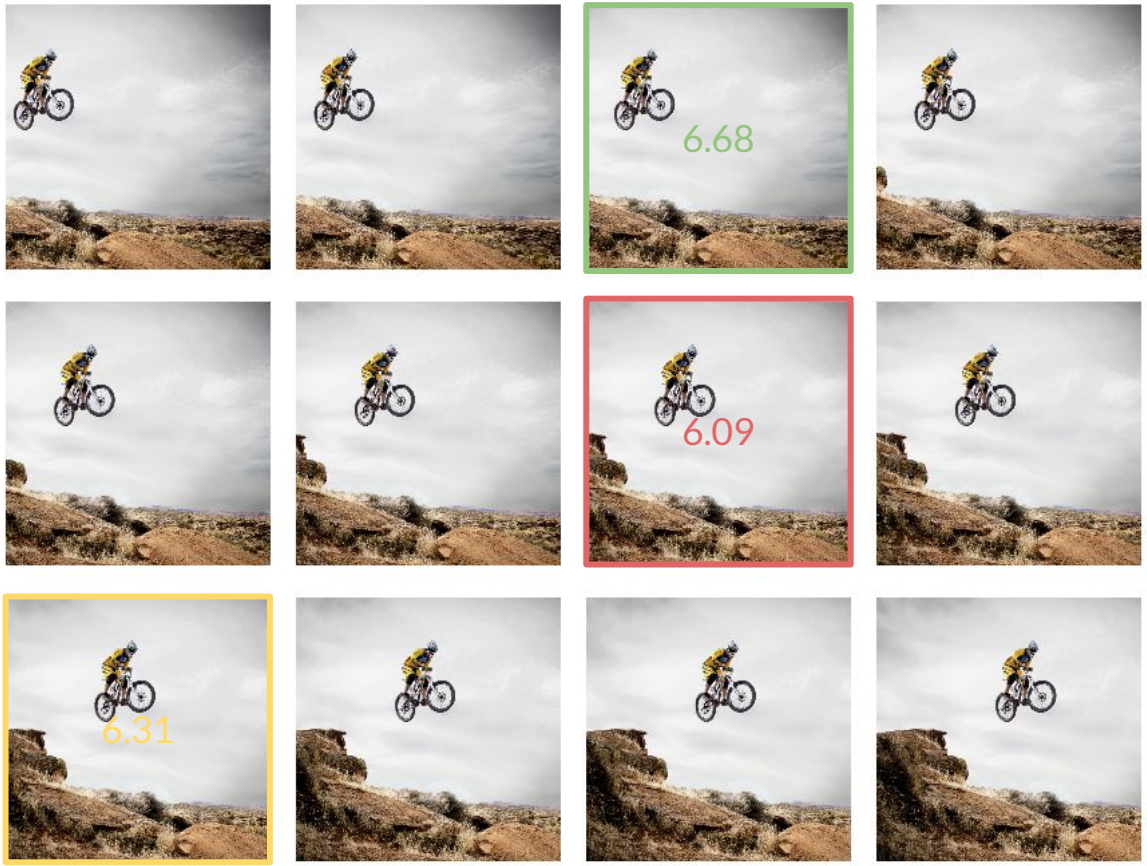
Content

1. Visual attention analysis

   A saliency heatmap is generated

2. Cropping regions proposal
3. Content preservation ranking

   Best regions are selected by content



Aesthetics

1. Aesthetics scoring

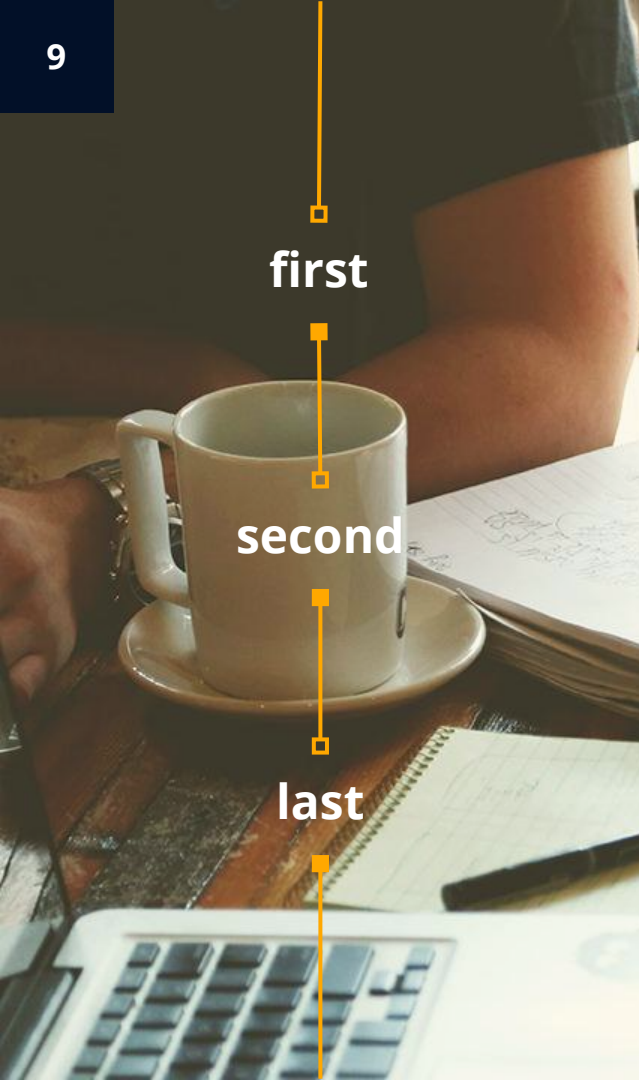
   Sorts crops by their aesthetics prediction

2. Final selection and resize

Best score

Intermediate score

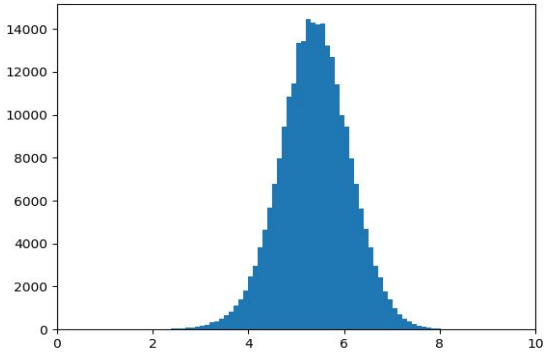
Worst score

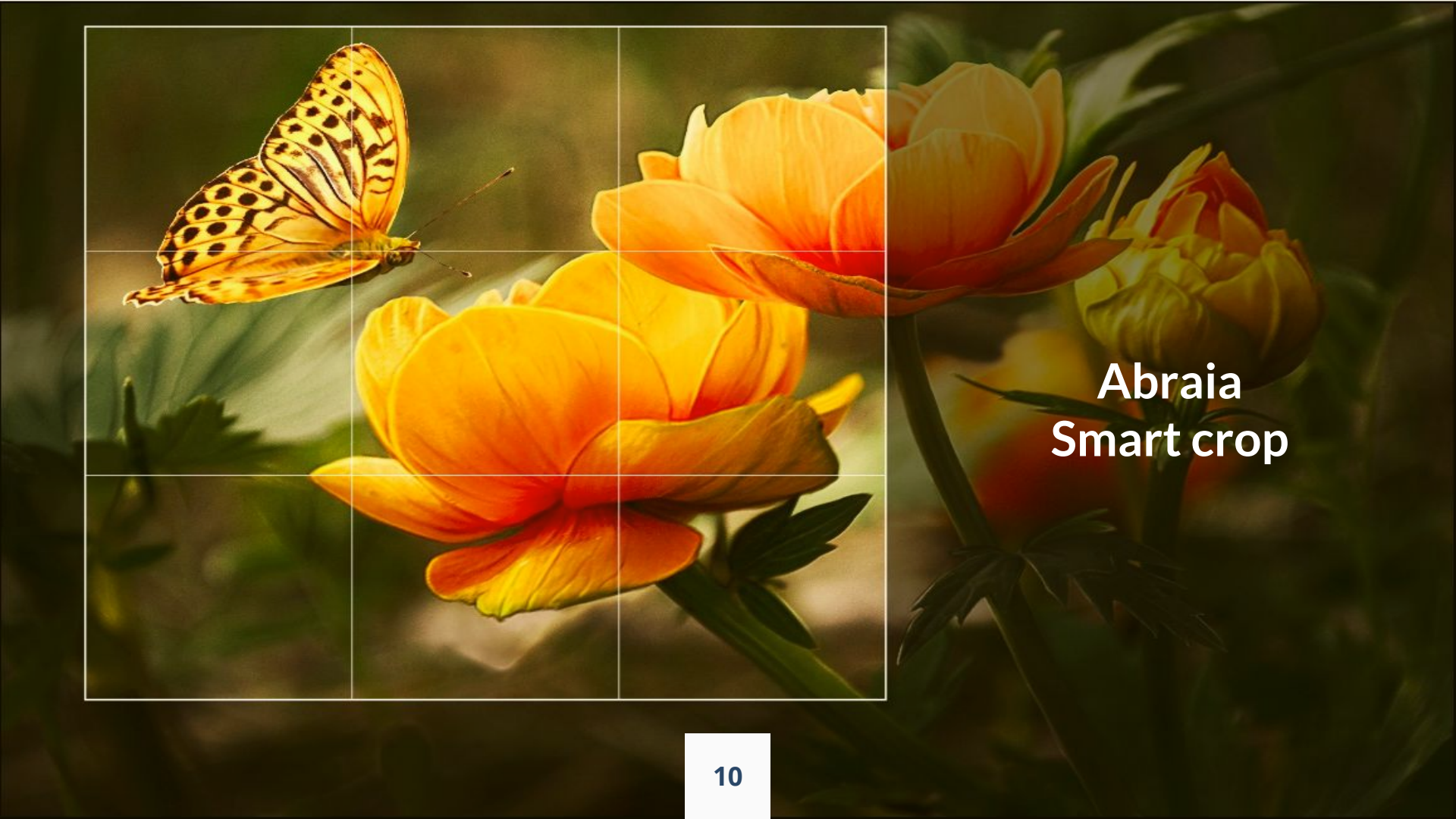


Aesthetics prediction with CNNs

- Regression model
  - Predict the average aesthetic score
  - Based on MobileNet architecture
- WMSE as loss function:
  - Weighted Mean Squared Error (WMSE)
  - To reduce the bias introduced by the unbalanced training dataset
- AVA dataset
  - 70% train
  - 10% validation
  - 20% test
- Optimizer
  - RMSprop

MSE: 0.45 RMSE: 0.67

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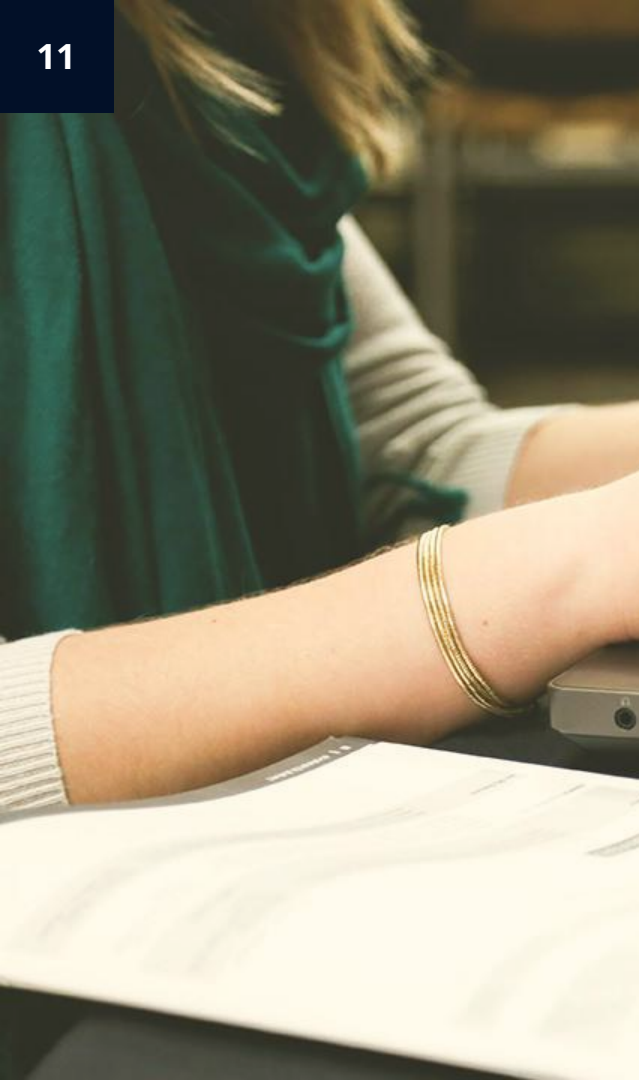
Smart crop



Conclusions

- Aesthetics is a subjective attribute
- Data are heavily unbalanced and biased
- Regression enables aesthetics image cropping

Next steps

- Prediction of aesthetics attributes
- Automatic image enhancement

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Thanks!

Questions?

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