The influence of noise on the consistency of human edge perception in natural images

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Introduction

Perception Of Edges

Boundaries of objects
Movements are adapted
Allow for meaningful interactions

Frequency Ranges

Different types of noise interfere with human edge perception to different degrees

Jarl‘s Experiment

Used as an approach
GitLab-Repo Compsy-edge-segmentation

Research Question

How does noise affect the consistency of human edge perception in natural images?

Goal:

Get valid conclusions about underlying mechanisms of human edge perception

Experimental Design And Method Description

Segmentation Task

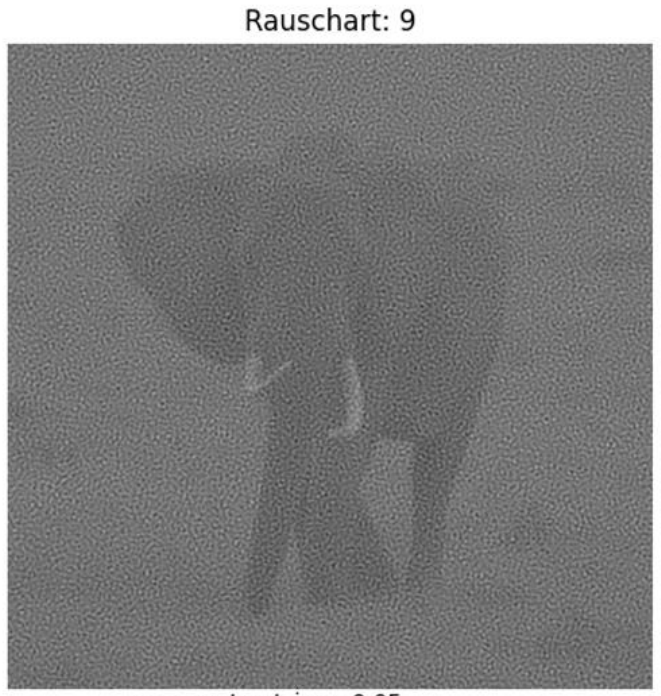
Visible contours should be traced by the observer

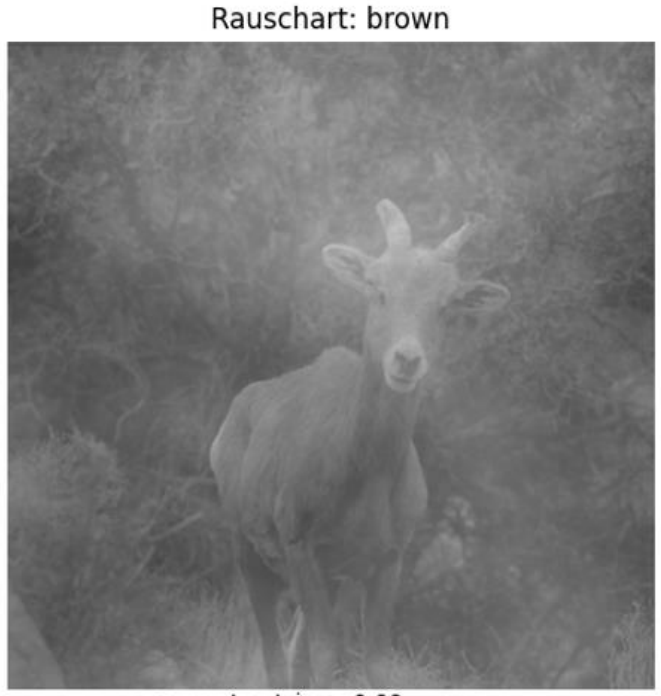
Stimuli

7 noise conditions
5 image contrasts levels
→ 35 different Stimuli
Different image for each condition

Oberservers

In total 4 observers
Comparison of the segmentations with each other
→ Interobserver variability





Preparation

GitLab-Repo

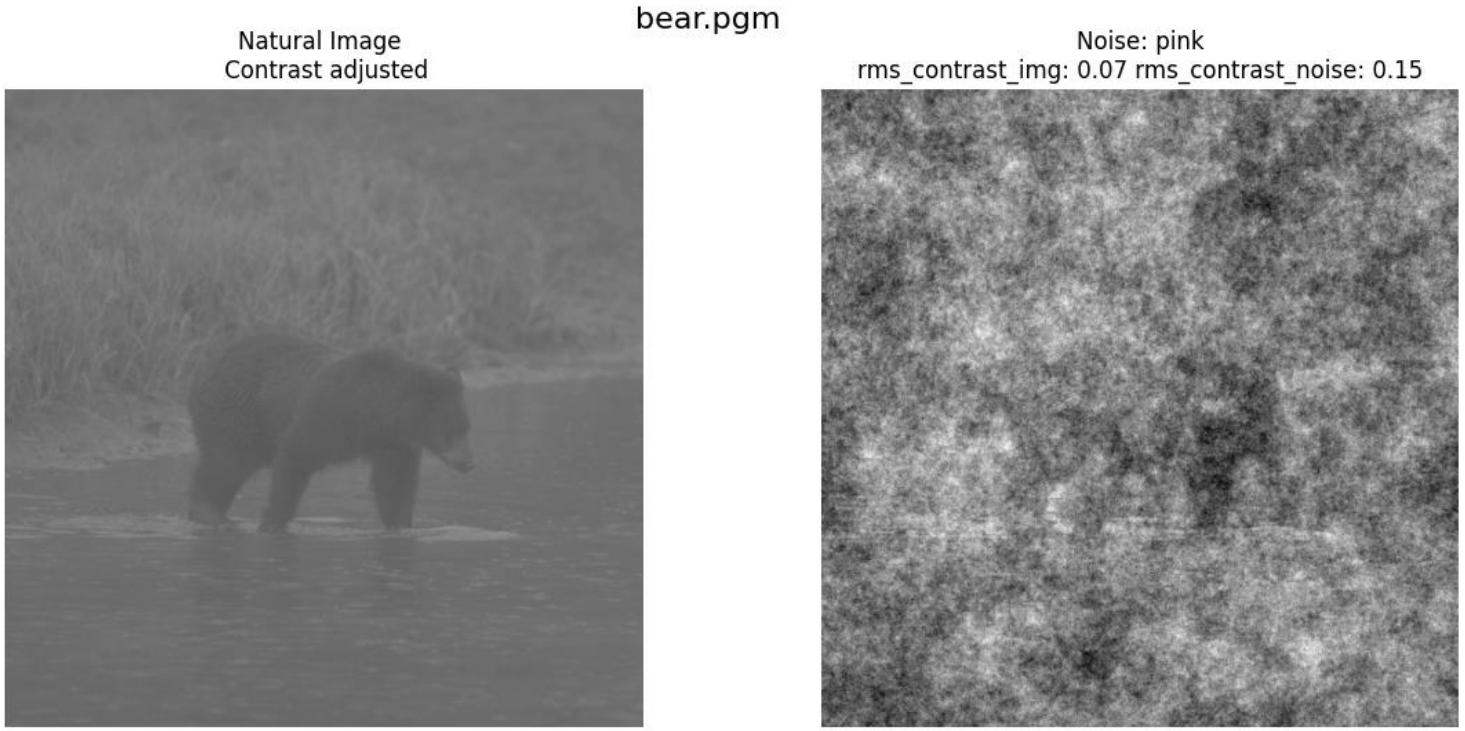
Adjust code for my experiment:

- Stimuli creation
- More flexible reading of parameters

Have The Experiment Ready For Use

Test run works as desired:

- Random presentation order
- Saving the segmentations for further processing



Observers

Finding suitable observers and arranging appointments for the experiment

Quality Measurement And Evaluation

Ground Truth

Contour maps provided in the image data set

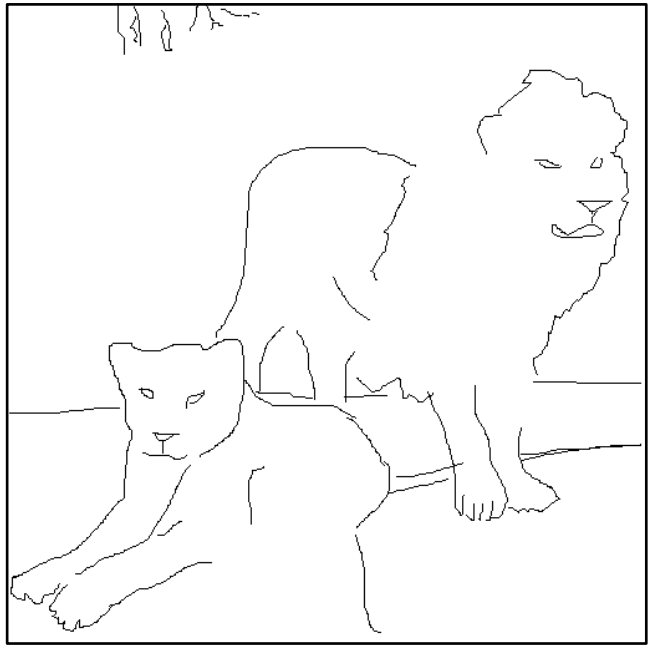
Quantify Similarity

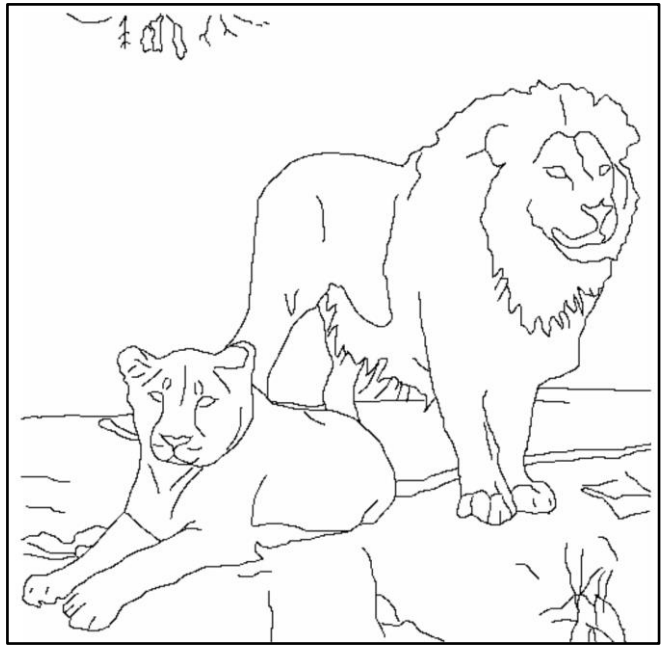
Grigorescu et al., 2003

$$P = \frac{|E|}{|E|+|E_{FP}|+|E_{FN}|}$$

Visualize Results Effectively

Customize a visualizations Jupyter-notebook and display results in a meaningful way





After The Experiment

Documentation

Includes the entire research work on paper

By the end of the phase the thesis should be written

Structure Of Thesis

- Introduction: Motivation, Definition of terms, preliminary work Jarl, aim of the work (Expose available)
- Methodology: Experimental design: stimuli, structure, procedure, observers, interobserver variability
- Results: Analyze data, visualizations, address possible discrepancies
- Discussion: literature research, interpretation of the results: bring into context with other relevant work, criticism/limitations

Current state

Code Adjustments

- New Jupyter-Notebook for stimuli creation
  - Parameters are read in flexibly via a CSV file
  - Random combinations: Stimuli creation + display sequence
  - Test run works as desired

Experimental Procedure And Schedule

- Description of the experimental procedure
- Timetable with work packages

What‘s Next

- Lab will be shown to me
- Find and arrange appointments with oberservers
  - Carry out experiment to collect data for further analysis