Subjective Image Quality Analysis

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Introduction

• An algorithm to predict subjective image quality can be used to help automate photo organization
  • to create automated slideshows, or summaries from large albums
  • to select the best among duplicate images

• It’s not obvious what makes a photo appealing to people, and in general this is a hard problem.

• I developed an algorithm that can predict the quality of photos, and that is efficient enough to be run easily on all of a user’s photos.

Dataset

• A good dataset is essential to both training the classifier and testing its performance.
  • I can’t afford to make my own dataset, so I used about 1,800 photos from reddit.com/r/itookapicture
  • Advantages: The dataset contains photos of a wide variety of subjects and styles, each scored by Reddit users.
  • Disadvantages: This dataset is pretty noisy. Additionally, poor quality photos are underrepresented.
  • For testing, I split the data into two categories:
    • “Good” images with ≥ 50 upvotes (48% of dataset)
    • “Bad” images with < 50 upvotes (52% of dataset)

Algorithm

Image Features:
• Technical quality: Sharpness, Contrast, Noise
• Blur: Depth of field, motion blur
• Color: Hue, Saturation
• Composition: Symmetry, rule of thirds
• Face detection
• Spatial envelope

Machine Learning:
• Random Forest Classifier
  • Uses the consensus of many randomized decision trees to make prediction.
  • Performs much better on this dataset than SVM and other linear methods.

Results

• Test: 10-fold cross-validation of the dataset.

• Results:
  • Always guess “bad”: 52% correctly classified
  • My algorithm: 62% correctly classified
  • Me, manually: 67% correctly classified
  • Algorithm is 2/3 as good as a human. The apparent poor performance of both is mostly from noise in the dataset.

• Efficiency: 150ms per photo without face detection, 300ms per photo with face detection.

Empirical Feature Importance

The result of running some of my own photos through the classifier.

Photos classified as good
Photos classified as bad