Subjective Image Quality Analysis  
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Motivation
Measuring the subjective quality of an image can be very useful. For example, with an accurate measure of how interesting and attractive each photo from an event is we could create high quality, automated slideshows and summaries. Often people take multiple pictures of the same scene, and these quality metrics could also be used for deduplication: once duplicate images have been identified, we can choose to keep only the best one.

There has been a reasonable amount of research done on this topic before. [2] is an example of an early series of experiments, while [1] was in the news only very recently. Modern methods have become very complex, for example [4] uses a complex layering of many feature extractors and multiple classifiers to categorize photos. Such complex methods are clearly outside the scope of a final project. Rather than attempting to match the power of these approaches, in this project I’ll try to answer a simpler question: how well can an algorithm perform this task while minimizing complexity and maximizing speed.

Implementation
I propose to use a wide variety of image processing techniques to measure features I think will be relevant to image quality. For example:

- Sharpness can be measured by looking at local contrast. Perhaps with a high pass filter, or an edge detector.
- Various color features: saturation, complementary colors, identifying and characterizing monochromatic regions in an image.
- Structural features, for example symmetry and the rule of thirds. The best proxy for these will probably be the distribution of edges or regions with high complexity.
- Face detection and other types of object detection will likely be useful as well.

Many of these have been tried before (in for example [4]). Clearly much of my task will be to expand on this list.

Then, I plan to use this data in a supervised learning algorithm to create a classifier that can estimate the quality of new images.

I don’t plan to use an Android phone.
Challenges

The image processing portions of the project could range from relatively straightforward to very complex. As mentioned above, some of the methods described in the literature are far more involved than is reasonable for this project, but all of the ideas listed above will be easily feasible. Most of the work will probably be inventing new approaches in addition to the short list above, and experimenting with different approaches to see what is most effective.

Additionally, acquiring suitable training data for classification may be difficult. There are no publicly available training sets specifically for this task. However, there are many websites that have pictures and ratings, such as Flickr and Reddit, so I don’t think this will be a big problem. However, these sources are very biased: people tend to only share their best images, and likely only certain types of images, so many classes of image will be underrepresented. This is a problem that I will have to address to be able to accurately quantify algorithm performance.

References


