Active Learning for Image Classification

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Abstract
We built an application that allows users to classify any image set quickly using active learning. The user uploads images, selects labels, and begins labeling on a user-friendly interface. After a threshold number of labeled images, the images are presented for labeling by descending ambiguity. By selecting the most ambiguous images for training, the active learning model reaches peak accuracy more quickly. Finally, the application returns the classified dataset.

Motivations and Use Case
• Enable non-technical users to classify images through an accessible, user-friendly application
• Use active learning to speed up the training process and limit the size of the training image set
• Integrate with Amazon Mechanical Turk to gain familiarity with the API and reduce labeling costs for the user in the case of larger image sets

Use Case
Remote Fashion Styling
• Classification of styles or types of clothing
• Efficient and consistent labeling across stylists

Technical Concepts
Histogram of Oriented Gradients: converts image into feature vector to be used in image classification

Active Learning
Given labeled data, an active learning algorithm selects the new data points it needs to improve the algorithm

Results
Active vs. Randomized Classifier
While both random and active learning accuracies plateau relatively quickly, the active learning model reaches this level faster

Conclusion
• Built a user-friendly active learning web application that allows users to classify images with user generated labels
• Active learning helps to reduce the time necessary to accurately label the data
• We saw modest gains from active learning
• Active learning most useful when there is a large amount of data or the labeling task is difficult