Application of Object Identification in Social Media Images

CS 766 Proposal

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Introduction

Social media has become increasingly popular in the last decade and has changed the way of communication. As an influential platform, companies try to promote and advertise their products to the crowd via some of the most attractive social network websites such as *Facebook* and *Instagram*. In particular, companies target their products based on people's interests[1], user public profile information and other information that users submit but is private to others[2].

In this project, we propose a creative approach for this type of advertising based on the pictures displayed on social media. Rather than extracting information from users profile or their interests, we attempt to recognize objects (or products) that are in the pictures, and identify if the objects are in a set of pre-defined product categories. The system will then determine how often does an object appear on the pictures and based on that information label the user as a potential customer. In this way companies need not relying on user information, where in cases users do not provide information, to promote their products.

Related Work

Social media advertising is able to target its audience in a variety ways due to the fact that social network websites capture lots of user information. Some of the marketing methods include targeting users interests, purchasing behavior and looking at audience that are similar to users[3]. A report from *BusinessInsider* suggests that over 90% of the most engaging posts on *Facebook* are photos[4]. Companies even market their products on the social media account pages[4]. However, there are not many companies engage in advertising using computer vision.

In the field of computer vision, or in the context of object recognition, the state-of-the-art technology involves using a machine learning technique called Convolutional Neural Network (CNN), which is a type of deep learning neural networks. CNN has multiple layers of neurons that process part of the input image, and the outputs are then tiled so that they overlap to obtain a better representation of the original image[5]. The process is then repeated for each layer[5]. This technology is widely used in image recognition and it will be the method we will employ in the project.

Technical Part

• Data Set

– Product Categories
We pre-define 10 initial product categories that focus on the probable interests of young generations: skateboard, guitar, beer, cat, bicycle, book, pizza, paintball marker, shoes and piano. This list would probably be modified in future stages.

– Instagram Data
We plan to use the Instagram API to extract a number of images for each hashtag, namely category. Besides, we need to extract some images to represent the "Noisy" class. Because of the fact that our algorithm may sometimes not be able to classify an Instagram image into one of the ten categories with sufficient evidence, a "Noisy" class is introduced as an alternative to the 10 categories.

– Data sets from ImageNet
We also need to obtain labeled training data for each category from ImageNet, which will be roughly 1000 images per category.

• Approach

Inspired by the recent work [6], which demonstrates that deep learning is able to achieve super-human accuracy levels on standard object classification benchmarks such as ImageNet Large Scale Visual Recognition Challenge (ILSVRC), we propose to use Convolutional Neural Network to solve our problem.

The training set is composed of all the images from ImageNet and part of the images from Instagram, while the other part from Instagram becomes the testing set. Our task is to classify each image in the testing set into one of the 11 classes (10 categories plus the "Noisy" class). We will train our generic CNN model using the Caffe framework [7], which is a deep learning framework, so that we can spend more time on creating good classifiers and solve our problems. Besides, we will compare the performance of our own model to some other pre-trained models such GoogLeNet.

• Significance

If this new approach is successful, we can expand the system with more product categories. Thus, it provides an alternative to collecting user information from social media for online advertising.

Milestone (approximated)

- Feb 15: Proposal due
- Feb 15-Mar 28: Collecting data, creating prototypes
- Mar 28: Mid-term Report due
- Mar 28-May 2: Improving prototypes, finalizing the process
- May 2: Project Presentation
- May 6: Final Report due

References

[1] http://www.forbes.com/sites/groupthink/2013/05/01/how-to-triple-your-success-using-social-media-advertising-platforms

[2] Shih, Clara (2011). The Facebook Era: Tapping Online Social Networks to Market, Sell, and Innovate. Boston: Prentice Hall. p. 111.

[3] http://marketingland.com/social-media-advertising-set-explode-next-3-years-121691

[4] http://www.businessinsider.com/photos-are-93-of-the-most-engaging-facebook-posts-2013-7

[5] https://en.wikipedia.org/wiki/Convolutional_neural_network

[6] Sergey Ioffe, Christian Szegedy. Batch Normalization: Accelerating Deep Network Training by Reducing Internal Covariate Shift

[7] http://caffe.berkeleyvision.org/