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Collaborative reviews analysis for multi-domain data using opinion mining approach

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ABSTRACT

We propose a collaborative multi-domain reviews classification by opinion mining approach to train reviews classifiers for multiple domains simultaneously. In our approach, the reviews information in different domains is shared to train more accurate and robust reviews classifiers for each domain when labeled data is scarce. Specifically, we decompose the reviews classifier of each domain into two components, a global one and a domain-specific one. The global model can capture the general reviews knowledge and is shared by various domains. The domain-specific model can capture the specific reviews expressions in each domain. In addition, we extract domain-specific reviews knowledge from both labeled and unlabeled samples in each domain and use it to enhance the learning of domain-specific reviews classifiers. Besides, we incorporate the similarities between domains into our approach as regularization over the domain-specific reviews classifiers to encourage the sharing of reviews information between similar domains. Two kinds of domain similarity measures are explored, one based on textual content and the other one based on reviews expressions. Moreover, we introduce two efficient algorithms to solve the model of our approach. Experimental results on benchmark datasets show that our approach can effectively improve the performance of multi-domain reviews classification and significantly outperform baseline methods.

Keywords: Opinion mining and Reviews classifiers.

INTRODUCTION

Mining the reviews information in the massive user generated content can help to sense the public's opinions towards a mixture of topics, such as products, brands, disasters, events, celebrities and so going on, and it is useful in many applications. For occurrence, researchers have established that analyzing the reviews in tweets has the probable to foresee distinction of stock marketplace prices and presidential selection results. Classifying the reviews of massive micro blog messages is also helpful to substitute or supplement traditional polling, which is expensive and time-consuming.

Product review reviews analysis can help companies improve their products and services, and help customers make more informed decisions. Analyzing the reviews of customer generated satisfied is also confirmed useful for client interest removal, personalized recommendation, social publicity, purchaser relation management, and crisis management. As a result, reviews classification is a hot research topic in both industrial and academic fields [1-5].

METHODOLOGY

Opinion mining and Reviews analysis

With the growing availability and reputation of estimation-rich capital such as online review sites and private blogs, new opportunities and challenges occur as people now can, and do,

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aggressively use in sequence technologies to search for out and recognize the opinions of others. The unexpected explosion of activity in the area of view mining and reviews study, which deals with the computational treatment of opinion, reviews, and partisanship in text, has consequently occurred at least in element as a direct answer to the rush of interest in innovative systems that deal straight with opinions as unparalleled object.

Opinion Flow

The copy is derived based on two explanations. First, significant users on common media are more expected to transform the opinions of supplementary users. Second, discerning Exposure a elementary theory from media and statement studies, suggests that a user tends to accept an opinion with the purpose of is comparable to his judgment. Thus, incorporate authority and opinion similarity factors into our model.

Machine Learning Techniques

Using movie reviews as data, notice that standard engine learning techniques definitively do better than human-produced baselines. Nevertheless, the two machine learning methods are engaged (highest entropy cataloguing, and support vector machines) do not make as well on reviews classification as on long-established topic-based labeling. To terminate by tentative factors that makes the emotion classification problem more demanding.

Nowadays, very large amounts of information are available in on-line documents. As ingredient of the endeavor to better arrange this information for users, researchers have been actively investigating the problem of regular text cataloguing.

Domain Revision for Reviews analysis

Reviews are uttered in a different way in dissimilar domains, and annotating corpora for every probable area of attention is not viable. To look into domain edition for emotion classifiers, focusing on online reviews for dissimilar types of goods.

First, lengthen to response arrangement the recently-proposed structural correspondence learning (SCL) algorithm, dropping the relation fault due to edition between domains by an average of 30% over the original SCL algorithm and 46% over a supervised baseline. Second, to identify a measure of domain comparison that correlates well with the possible for adaptation of a classifier from one area to another.

Multi domain Reviews Classification

Reviews classification has been widely known as a highly domain-dependent problem. For example, Pang et al. built reviews classifiers for movie reviews using machine learning techniques such as SVM based on the labeled data of this domain. Lu et al. proposed to construct a domain-specific reviews lexicon by incorporating information from various sources in this domain, such as reviews labels and linguistic heuristics.

However, in many domains, the labeled data is usually in limited size and insufficient to extract accurate and robust reviews information. In addition, since there are massive domains involved in online user generated content, it is expensive and time-consuming to manually annotate enough samples for each domain [6-10].

Optimization Method

In addition, the learning processes of reviews classifiers in different domains are coupled together in our approach in order to exploit the reviews relatedness among these domains. Thus, it is challenging to solve the optimization problem in our approach efficiently. In this work, this project introduces an accelerated algorithm based on FISTA to solve the model of our approach.

In addition, this project proposes a parallel algorithm based on ADMM to train reviews classifiers for multiple domains in a parallel way, which can further improve the efficiency of our approach when domains to be analyzed are massive. Next this project will introduce them in detail.

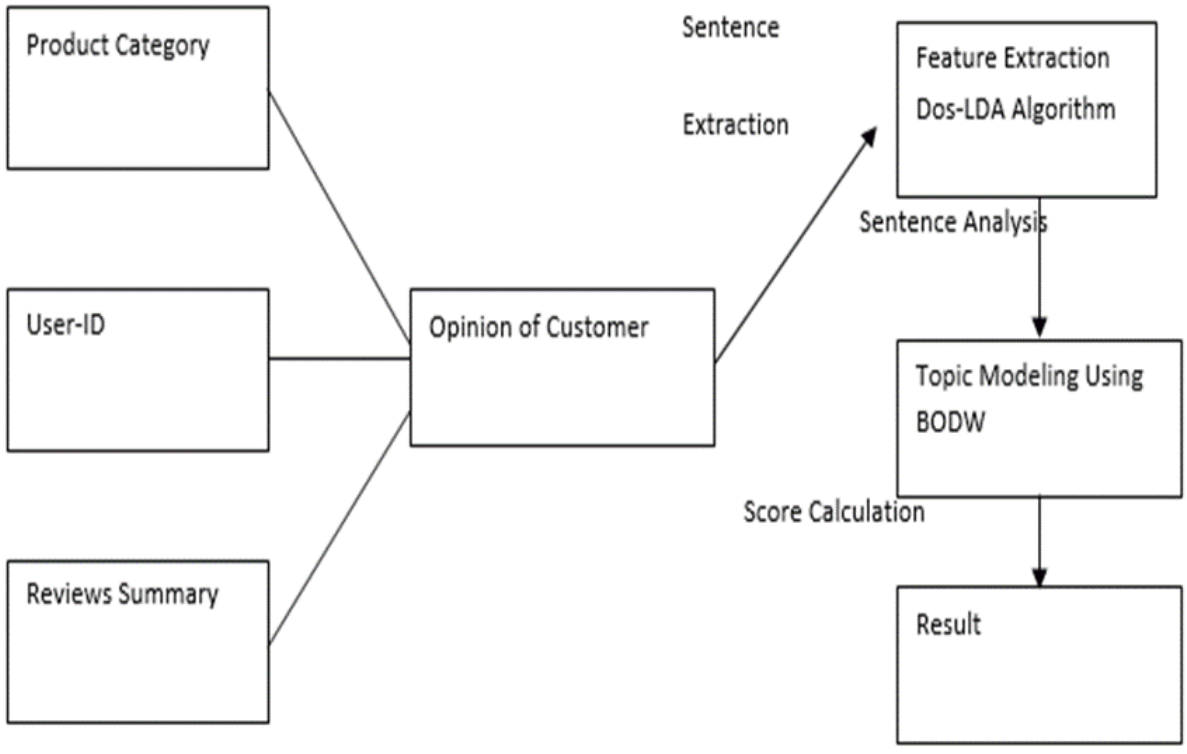
Collaborative Online Multi-Tasking

We study the problem of online multitask learning for solving multiple related classification tasks in parallel, aiming at classifying every sequence of data received by each task accurately and efficiently. One practical example of online multitasks learning is the micro-blog reviews

detection on a group of users, which classifies micro-blog posts generated by each user into emotional or non-emotional categories.

First of all, to meet the critical requirements of online applications, a highly efficient and scalable classification solution that can make immediate predictions with low learning cost is needed. This requirement leaves conventional batch learning algorithms out of consideration.

Second, classical classification methods, be it batch or online, often encounter a dilemma when applied to a group of tasks, i.e., on one hand, a single classification model trained on the entire collection of data from all tasks may fail to capture characteristics of individual task; on the other hand, a model trained independently on individual tasks may suffer from insufficient training data. To overcome these challenges, in this paper, we propose a collaborative online multitask learning method, which learns a global model over the entire data of all tasks. At the same time, individual models for multiple related tasks are jointly inferred by leveraging the global model through a collaborative online-learning-approach.



System Architecture

ACCELERATED ALGORITHM

This project introduce the ENB based accelerated algorithm for our approach which can be conducted on a single computing node. As mentioned before, the optimization problem in our approach is no smooth. Although this project can use sub gradient descent method to solve it, the convergence rate of sub gradient method is $O(\frac{1}{\sqrt{k}})$ and is far from satisfactory, where k is the number of iterations [11-15].

Different from gradient method and sub gradient method where in each iteration the current solution is computed using the last solution, in FISTA the current solution is estimated using the last two solutions and the "momentum" between

them is exploited to accelerate the optimization process. In each iteration of FISTA, two kinds of points are sequentially updated.

Active Learning

However, existing active learning work has mainly focused on training models for a single domain. In practical applications, it is common to simultaneously train classifiers for multiple domains. For example, some merchant web sites (like Amazon.com) may need a set of classifiers to predict the reviews polarity of product reviews collected from various domains (e.g., electronics, books, shoes).

Though different domains have their own unique features, they may share some common latent features. If projects have applied active learning on each domain separately, some data instances selected from different domains knowledge due to the common features.

In our solution, a shared subspace is first learned to represent common latent features of different domains. By considering the common and the domain-specific features together, the model loss reduction induced by each data instance can be decomposed into a common part and a domain-specific part. In this way, the duplicate.

CUSTOMER REVIEWS

Producers selling their products on the Web like Amazon, Flipchart, and Snap deal often ask their customers to review the products that they have purchased. As e-commerce is becoming more and more popular, the number of customer reviews that a product receives grows rapidly. For a popular product, the number of reviews can be in hundreds or even thousands. This makes it difficult for an ordinary customer to read them to make an informed decision on whether to purchase the product.

It also makes it difficult for the manufacturer of the product to keep track and to manage customer opinions. For the manufacturer, there are additional difficulties because many producer sites may sell the same product and the manufacturer normally produces many kinds of products. In this research, we aim to mine and to summarize all the customer reviews of a product.

CONCLUSION

System presents a collaborative multi-domain reviews classification approach. Approach can learn accurate reviews classifiers for multiple domains simultaneously in a collaborative way and handle the problem of insufficient labeled data by exploiting the reviews relatedness between different domains. The reviews classifier of each domain is decomposed into two components, a global one and a domain-specific one.

The global model can capture the general reviews knowledge shared by different domains and the domain-specific models are used to capture the specific reviews expressions of each domain.

In addition, propose to incorporate the similarities between different domains into approach as regularization over the domain-specific reviews classifiers to encourage the sharing of reviews information between similar domains.

Moreover, to introduce an accelerated algorithm to solve the model of our approach efficiently, and propose a parallel algorithm to further improve its efficiency when domains to be analyzed are massive. Experimental results on benchmark datasets show that approach can effectively improve the performance of multi-domain reviews classification, and significantly outperform baseline methods.

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