STANDARDIZING PICTURE RETRIVAL VARIATION METHODS FOR WEB-BASED COMMUNITIES

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ABSTRACT

Image retrieval has been an active research domain for over 30 years and historically it has focused primarily on precision as an evaluation criterion. Similar to text retrieval, where the number of indexed documents became large and many relevant documents exist, it is of high importance to highlight diversity in the search results to provide better results for the user.

The Retrieving Diverse Social Images Task of the Media Eval bench marking campaign has addressed exactly this challenge of retrieving diverse and relevant results for the past years, specifically in the social media context. Multi modal data (e.g., images, text) was made available to the participants including metadata assigned to the images, user IDs, and pre-computed visual and text descriptors.

Many teams have participated in the task over the years. The large number of publications employing the data and also citations of the overview articles underline the importance of this topic. In this paper, we introduce these publicly available data resources as well as the evaluation framework, and provide an in-depth analysis of the crucial aspects of social image search diversification, such as the capabilities and the evolution of existing systems.

These evaluation resources will help researchers for the coming years in analyzing aspects of multi modal image retrieval and diversity of the search results.

I. INTRODUCTION

Image retrieval has been an extremely active research domain over the past 30 years [1], [2]. Starting with text based retrieval of images and then moving towards content based image retrieval and multimodal approaches, the techniques have constantly evolved to high quality of retrieval and increasingly large data sets [3], [4]. The evaluation of retrieval approaches has traditionally focused on early precision in retrieval results and on mean average precision (MAP) [5]–[7], and for specific applications, e.g., patent retrieval, on recall. With increasingly large data sets and many potentially relevant images, precision as an evaluation criterion is not sufficient anymore and requires complementary measures.

In most cases, systems aim to improve the relevance of the results assuming that the results for a query are single topic. This is not an accurate assumption anymore in the context of the current Internet, because many of the queries cover different aspects, i.e., sub-topics. For instance, objectsin images show different information and have different contexts, landmarks can be captured in various conditions and angles, e.g., day-night, close-far, bicycles serve different usages conditions, e.g., city, mountain, road, vehicles are of different types, and so on. An effective retrieval system should also take into account the diversification of the results [8].

An example is provided in Figure 1. To improve the diversity of search results, one has to consider the multiple and diverse topics, contexts, intents, and interpretations of a certain query. Increasing the diversity increases also the efficiency and usefulness of the system via providing a wider selection of results and therefore, a higher chance that they address the user real needs.

A concrete example are the recommender systems, where the users' satisfaction increases with the diversification of the results. With this concept, cluster recall was introduced as a measure for diversity in image retrieval [8]. The Retrieving Diverse Social Images Task, we are introducing in this paper, has been organized under the MediaEval Benchmarking Initiative for Multimedia Evaluation and has evaluated such approaches over the past years [9]–[13]. Another important aspect of image retrieval is the availability of many input sources, e.g., not only features that represent the visual image content and textual metadata, but also information on the person posting data, tags added by other persons and possible GPS (Global Positioning System) data. Some of this

information may represent what is in the image, others what the image is about but also emotional responses, for example the feeling that an image evokes and the context in which it was taken.

The Retrieving Diverse Social Images Task addressed these aspects and created a benchmark framework so that practitioners could choose from a large number of data sources. Additionally, various visualand text-based content descriptors were made available to limit the entry requirements for systems [9], [12] while focusing on diversification. The large number of publications employing the various data sets from the task and the increasing number of citations underline the importance and the high impact of the task. With the public availability of resources, we expect the impact and usage of the resources to increase strongly over the coming years, similar to other related benchmarking campaigns [14]. Thus, it seems important to analyze the benchmark and to describe the main challenges and lessons learned to foster further research in the context of image retrieval diversification. The remainder of the article is organized as follows. Section II positions our work in the context of the state of the art and highlights its contribution. Section III introduces the proposed social image search diversification benchmark framework.

I. LITERATURE SURVEY

TITLE:- Content–based image retrieval at the end of the early years

AUTHORS:- A. W. M. Smeulders, M. Worring, S. Santini, A. Gupta, and R. Jain

ABSTRACT:- Presents a review of 200 references in content-based image retrieval. The paper starts with discussing the working conditions of content-based retrieval: patterns of use, types of pictures, the role of semantics, and the sensory gap. Subsequent sections discuss computational steps for image retrieval systems.

Step one of the review is image processing for retrieval sorted by color, texture, and local geometry. Features for retrieval are discussed next, sorted by: accumulative and global features, salient points, object and shape features, signs, and structural combinations thereof. Similarity of pictures and objects in pictures is reviewed for each of the feature types, in close connection to the types and means of feedback the user of the systems is capable of giving by interaction.

We briefly discuss aspects of system engineering: databases, system architecture, and evaluation. In the concluding section, we present our view on: the driving force of the field, the heritage from computer vision, the influence on computer vision, the role of similarity and of interaction, the need for databases, the problem of evaluation, and the role of the semantic gap.

TITLE: - Performance evaluation in content–based image retrieval: Overview and proposals AUTHORS: - H. Muller, W. M ¨ uller, D. M. Squire, S. Marchand-Maillet, and T. Pun ABSTRACT:- Evaluation of retrieval performance is a crucial problem in content-based image retrieval (CBIR). Many different methods for measuring the performance of a system have been created and used by researchers. This article discusses the advantages and shortcomings of the performance measures currently used. Problems such as defining a common image database for performance comparisons and a means of getting relevance judgments (or ground truth) for queries are explained. The relationship between CBIR and information retrieval (IR) is made clear, since IR researchers have decades of experience with the evaluation problem. Many of their solutions can be used for CBIR, despite the differences between the fields. Several methods used in text retrieval are explained. Proposals for performance measures and means of developing a standard test suite for CBIR, similar to that used in IR at the annual Text REtrieval Conference (TREC), are presented.

TITLE: - Result Diversification in Social Image Retrieval: A Benchmarking Framework

AUTHORS: - B. Ionescu, A. Popescu, A.-L. Radu, and H. Muller

ABSTRACT:- This article addresses the diversification of image retrieval results in the context of image retrieval from social media. It proposes a benchmarking framework together with an annotated dataset and discusses the results achieved during the related task run in the MediaEval 2013 benchmark.

38 multimedia diversification systems, varying from graph-based representations, re-ranking, optimization approaches, data clustering to hybrid approaches that included a human in the loop, and their results are

described and analyzed in this text.

A comparison of the use of expert vs. crowdsourcing annotations shows that crowd sourcing results have a slightly lower inter-rater agreement but results are comparable at a much lower cost than expert annotators. Multimodal approaches have best results in terms of cluster recall. Manual approaches can lead to high precision but often lower diversity. With this detailed results analysis we give future insights into diversity in image retrieval and also for preparing new evaluation campaigns in related areas.

TITLE: -Tailoring music recommendations to users by considering diversity, main steaminess and novelty

AUTHORS: - M. Schedl and D. Hauger,

ABSTRACT:- A shortcoming of current approaches for music recommendation is t that they consider user-specific characteristics only on a very simple level, typically as some kind of interaction between users and items when employing collaborative filtering. To alleviate this issue, we propose several user features that model aspects of the user's music listening behavior: diversity, mainstreaminess, and novelty of the user's music taste. To validate the proposed features, we conduct a comprehensive evaluation of a variety of music recommendation approaches (stand-alone and hybrids) on a collection of almost 200 million listening events gathered from \propername{Last.fm}. We report first results and highlight cases where our diversity, mainstreaminess, and novelty features can be beneficially integrated into music recommender systems.

II. SYSTEM ANALYSIS

EXISTING SYSTEM:

In terms of diversification methods, a broad range of articles addressed the diversification of images in the context of geographical applications (e.g., landmarks and general geographical summaries) [25], [35]–[39]. For example, Rudinac et al. [25] creates visual summaries of geographic areas using user-contributed images and related metadata.

The approach is based on a Random Walk scheme with restarts over a graph that models relations between images, visual features, userprovided metadata, and the information on the uploader and commentators. Radu et al. [36] employed a crowd-sourcing approach to improve the initial results achieved by an automated visual analysis of the retrieval results for monument queries. To avoid the use of human expertise, Boteanu et al. [39] considered pseudo-relevance feedback, where user feedback is simulated by the selection of positive and negative examples from the initial query results.

For a thorough survey of recent approaches, we refer to [9], [18]. Existing approaches in the context of geographical locations are not necessarily tailored to the characteristics of the application scenario (e.g., the availability of GPS information). However, location-based queries are usually well-defined and with a partially limited degree of visual diversity.

Disadvantages:

1.Many teams have participated in the task over the years. The large number of publications employing the data and also citations of the overview articles underline the importance of this topic.

2.This is not an accurate assumption anymore in the context of the current Internet,because many of the queries cover different aspects, i.e., sub-topics.

PROPOSED SYSTEM:

To explore the generalization ability of a given approach, thorough experiments on several data sets and application scenarios are required. A recent work in this direction is reported by Boato et al..

The authors make use of visual saliency information for the diversification of image retrieval results and present experiments on two data sets: a self-combined collection of publicly available data sets in the context of object categorization and the Div150Creddata set addressing the diversification of POI (points of interest) images retrieved from Flickr.

The reported results demonstrate a notable difference in the performance on the two application scenarios, i.e., while the improvement in the diversification on the object categories is significant, the difference on the location-based data set is marginal only. Images depicting different object categories are usually set around a centered main object in focus, which is in favor of the proposed approach.

In contrast, location-based images (from social media) depict a higher degree of visual variation and do not

necessarily follow common saliency rules. Another work demonstrating applicability across different application scenarios is presented by Desealers et al.

The authors employ dynamic programming for the optimization of relevance and diversity in two scenarios: retrieval of natural images and retrieval of product images.However, the authors provide only a qualitative evaluation on the product data, which limits the interpretability of the results. Additionally, the scenarios are build upon (semi-)professional photos and annotations, which differ notably from the characteristics of social media in terms of quality of both image data and associated metadata.

The current work brings additional value to the state of the art with the following main contributions:

1.It introduces a publicly available, common image search diversification benchmarking framework with explicit focus on social media aspects. The framework builds on current state-of-the-art retrieval technology (i.e., Flickr's relevance system), allowing to push diversification in priority. It comes with a large variety of data and query information (single, multi and adhoc topics) for complex scenarios;

2.It provides an in-depth analysis of the crucial aspects of image search diversification, such as the capabilities and the evolution of existing systems thorough the analysis of the results from the MediaEval Retrieving Diverse Social Images 2013 — 2016 tasks.

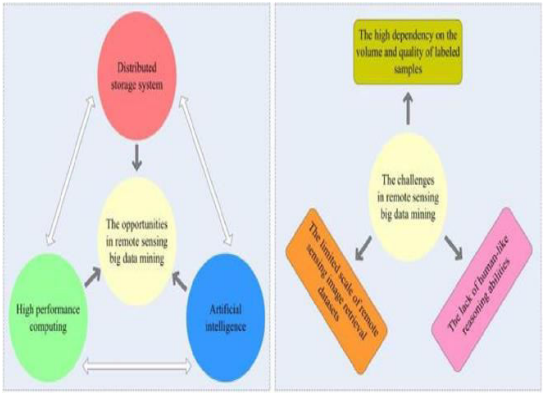
Experimental results highlight the social facets of the problem, the contribution of deep learning and user credibility information, the choice of feature combinations and fusion types, and various proposed approaches. To the best of our knowledge, this is the first comprehensive study covering all these core aspects of the social media diversification tasks.

Advantages:

1.we introduce these publicly available data resources as well as the evaluation framework, and provide an in-depth analysis of the crucial aspects of social image search diversification, such as the capabilities and the evolution of existing systems.

2.provide an in-depth analysis of the crucial aspects of social image search diversification.

SYSTEM ARCHITECTURE:



IV. IMPLEMENNTATION

MODULES

The major modules of the project are

- Data sets
- Content descriptors
- Ground truth
- Evaluation Methodology

MODULE DESCRIPTION

Data Sets

Several data sets were designed and created for benchmarking image retrieval diversification capabilities with the explicit focus on the actual social media context. The social aspects are reflected both in the nature of the data (variable quality of photos and of metadata shared on social media, assessment of user tagging credibility, etc.) and in the methods employing the data. All the data consists of redistributable Creative Commons Div400 data set Div150Cred data set Div150Multi data set Div150Adhoc data set

Content descriptors

To address a broader community, the data sets come with pre-computed content descriptors, namely: General-purpose visual descriptors: (Div400, Div150Cred, Div150Multi) for each image, the following descriptors are provided which are known to perform well on image retrieval tasks: global color naming histogram: maps colors to 11 universal color names, i.e., "black", "blue", "brown", "grey", "green", "orange", "pink", "purple", "red", "white", and "yellow"; global

Histogram of Oriented Gradients: represents the HoG feature computed on 3 by 3 image regions; global color moments on HSV (Hue- Saturation-Value) color space: represents the first three central moments of an image color distribution: mean, standard deviation and skewness; global Locally Binary Patterns on gray scale; global Color Structure Descriptor: represents the MPEG-7 Color Structure Descriptor computed on the HMMD (Hue- Min-Max-Difference) color space; global statistics on gray level Run Length Matrix: provides 11 statistics computed on gray level run-length matrices for 4 directions, e.g., Gray-Level Non-uniformity,High Gray-Level Run Emphasis, see; and their local spatial pyramid representations (descriptors are computed on image blocks of 3 by 3 pixels and then merged into a global descriptor).Text models and descriptors: (Div400, Div150Cred, Div150Multi, Div150Adhoc) all of the modern probabilistic models, from the original ideas of the Probability Ranking Principle to the relatively newer language modelling approaches, have as basic building blocks a component that quantifies the importance of a term t in a document d, F(tf t;d), and a component that quantifies the specificity of a term, F0(df t). F and F0 are control functions, often log or rational. The provided data comes with the tf t;d (term frequency) and df t (document frequency) values for all terms and documents. They are determined per data set basis, and within a data set per image basis, per query basis, and per user basis. To allow reproducibility, we also provide the index files generated with Lucene4 (can be used directly in Solr or ElasticSearch engines).

Ground truth

The presented data sets come with photo relevance and diversity annotations. To disambiguate the diversification, need, explicit definitions were provided. They were determined and validated in the community based on the feedback gathered from over 200 respondents during the MediaEval annual community surveys. Relevance: a photo is considered to be relevant if it is a common photo representation of the location/of all query concepts at once.

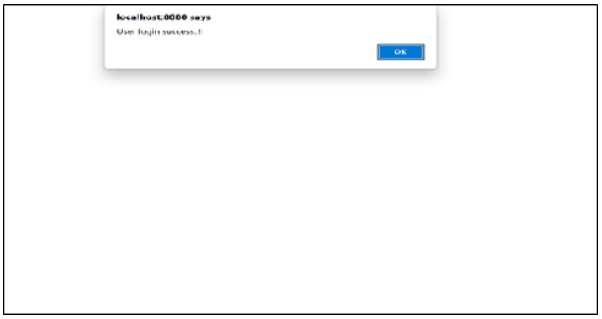
Bad quality photos, e.g., severely blurred, out of focus, etc., as well as photos with people as the main subject are not considered relevant. Diversity: a set of photos is considered to be diverse if it depicts different visual characteristics of the target location/concepts, e.g., sub-locations, temporal information, typical actors/objects, genesis and style information, with a certain degree of complementarity, i.e., most of the perceived visual information is different from one photo to another.

Evaluation Methodology

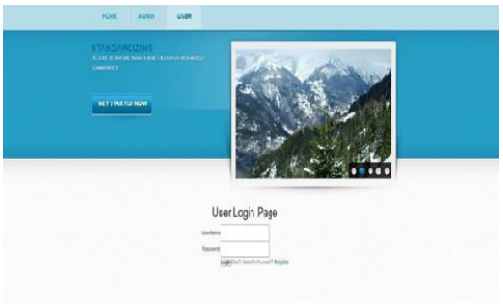
The classical evaluation metrics from information retrieval are widely used measures for the estimation of search quality. Effective metrics include the Mean Average Precision (MAP), the area under the ROC curve (AUC), and the normalized discounted cumulative gain(NDCG). However, these metrics do not consider diversity but focus on relevance only. In contrast, several evaluation measures address diversity but do not reflect relevance, such as classical clustering evaluation measures in, -NDCG, and user intent aware measures. To reflect both aspects, relevance and diversity, Jang et al. proposed a modified version of the average precision (AP). However, the proposed average diverse precision (ADP) metric defines diversity as a simple dissimilarity measure between ranked images. The missing consideration of the true diversity as provided by a ground truth annotation limits the comparability of the results achieved by different approaches.

OUTPUT SCREENS

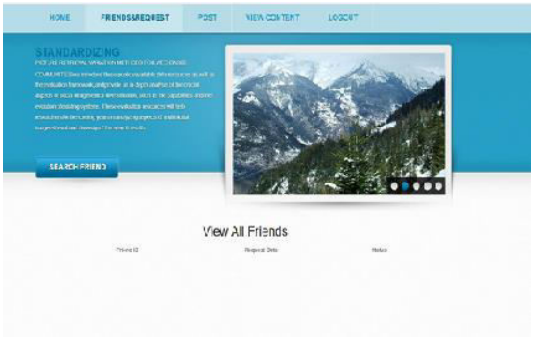
User Login success



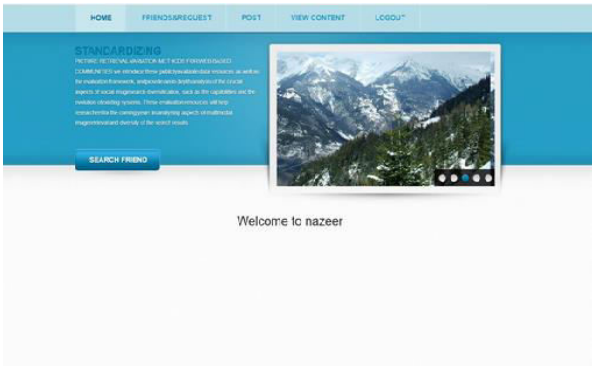
User Login Page



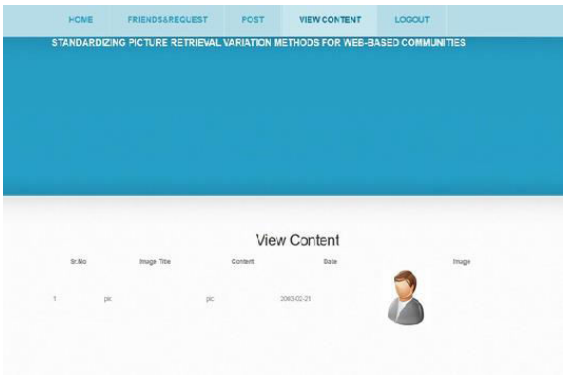
View All Friends



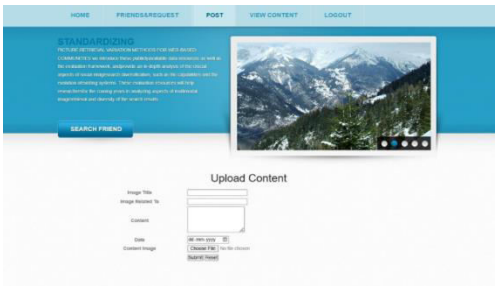
User Home Page



View Content



Upload Content



VI.CONCLUSION

CONCLUSION

We introduced a publicly available, common image search diversification benchmark framework that focuses explicitly on social media aspects. It consists of a very rich annotated data, with over 750 single, multi-topic and ad-hoc queries, 150k images and over 30M image links, metadata, various content descriptors for visual and text modalities.

As part of the Media Eval Retrieving Diverse Social Images Task, we analyzed four years of results and more than 180 submitted systems, with the objective to provide an in-depth analysis of the crucial aspects of diversification, such as the capabilities and the evolution of existing systems.

FUTURE SCOPE

Standardizing picture retrieval variation methods for web-based communities is an area with substantial future scope due to the growing importance of efficient and accurate image search and retrieval systems. Here are some potential directions and benefits of standardizing these methods:

Enhanced Interoperability

Scope: Standardization can lead to enhanced interoperability between different web-based platforms and services. This will enable seamless sharing and retrieval of images across various platforms.

Benefits:

Users can search for images across multiple platforms using a unified method.

Developers can integrate image retrieval functionalities more easily across different services.

Improved Search Accuracy

Scope: Developing standardized methods for image retrieval can significantly improve the accuracy of search results, making it easier for users to find relevant images.

Benefits:

Better user experience due to more relevantsearch results. Reduction in the time spent searching for specific images.

Consistency in User Experience

Scope: With standard methods, users will have a consistent experience regardless of the platform they use.

Benefits:

Users can rely on a predictable interface and search behavior. Easier to provide user support and documentation.

Facilitating Research and Development

Scope: Standardization can create a foundation for further research and development in the field of image retrieval.

Benefits:

Researchers can build on standardized methods to innovate and improve image retrieval technologies. Easier comparison of different retrieval techniques and algorithm

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