Demo: Image Recommendation with User Intent on a Mobile

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Abstract

The mobile devices photographing has greatly enriched people's interest, social and entertainment. The improvement of mobile devices processing chip and storage make the quality and quantity of pictures in mobile increased rapidly. Although mobile images can be simply categorized in existing work, there is no recommendation[5] list based on user's mind. This situation will bring great burden and poor experience to users when selecting image. In this paper, we proposed an plug-in system, named IRI(IRI, Image Recommendation with User Intent), to create a recommendation list which follows user's mind. In IRI, the user intent[1] can be sensed employing the text input. The multi-layer semantic relation library is used for assessing correlation between the image and sensed intent. We implement the IRI on mobile phone and test the accuracy of the intent sensing and energy consumption. The experimental results demonstrate the effectiveness and superiority of the IRI.

1 Introduction

With the rapid development of MEMS(Micro-electromechanical Systems), high-speed processing chip and mass storage capacity are realized in mobile devices. A large number of high-definition images can be taken and stored by users at any time in real life. Meanwhile, more and more people enjoy sharing images employing social platform, including Facebook, Twitter, WeChat, etc. However, the process of selecting images is not very simple caused by the massive HD images stored without any efficient ranking.

Nowadays, research on image classification[4] in mobile devices has achieved commendable results. A large number of mobile APPs, such as Slidebox, GooglePhoto and Facein, have been designed for image classification and achieved high accuracy. However, there are much burden for user to pick a certain image from a category of the classification results because the existing work only reduces the search space employing classification and no accurate recommendation according to the user's intention.

In order to essentially change the way that users select image on mobile devices, this paper propose an innovative plug-in system IRI, which can understand user's intention to a certain extent and recommend images of mobile phone with related rank[3]. The IRI can acquire images classes on mobile devices and then generate a multi-layer semantic relation library, which can represent all categories of images. When IRI get the text typed by user, it can recognize key words from the sentence and match multi-layer semantic relation library so that a rank of images are fed back to user. The major contribution of this work is to associate user's intention with image classification and make accurate recommendations with low energy cost. With this design, this paper makes mobile phone automatically recognize desired images of users, avoiding users manually select images and providing users with convenience in daily life.

2 System Architecture

In this section, we show IRI architecture as Figure 1, where dotted line is relation between different models and solid line is relation inside a model.

2.1 Multi-layer Semantic Relation Library

Thanks to the development of image classification softwares on mobile device, we can exploit classification result to generate a multi-layer semantic relation library.

Concretely, image classification result can be acquired from mobile phone. We construct a relation library by analyzing the relation of these various classes. We just store the relation of various classification. For example, we can take basketball and soccer into a relation named sport. For another scene, user's hobbies could be formed into a certain circle so we build some special relation for classes seems with little relation. For instance, a user prefers some delicious foods

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International Conference on Embedded Wireless Systems and Networks (EWSN) 2019
25–27 February, Beijing, China

ISBN: 978-0-9949886-3-8

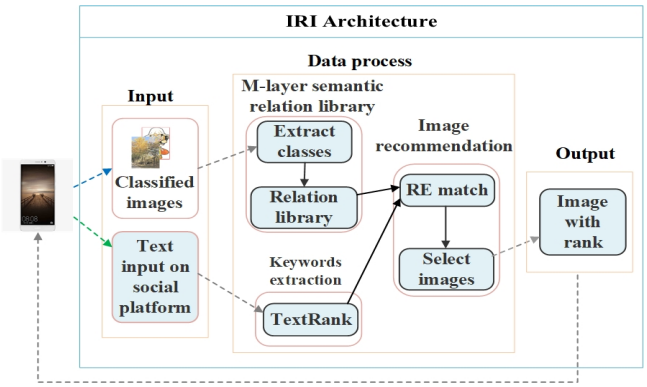

Figure 1. IRI: We exploit multi-layer semantic relation library and keywords extraction to match and recommend images for users.

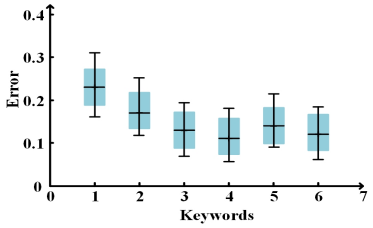

Figure 2. IRI accuracy: We test IRI with 20 volunteers and report the error rate of recommending images.

of a restaurant. Once he or she is willing to share the foods, may be restaurant environment included as well.

2.2 Keywords Extraction

When a user shares moment with images on social platform, we can obtain the text information by platform interface. We exploit TextRank[6] algorithm of jieba, a natural language processing[7] library, to generate a keywords list. Then we take times of these words as the weights for previous result and regard these weights as the rank of latter images recommendation.

2.3 Image Recommendation

Keywords extracted by TextRank algorithm can be used to match image class by using regular expression[2]. If we can perfectly match these keywords with a correct image class, we can precisely recommend related images with accordance of keywords which could represent user intent and make images ranked with corresponding sequence.

3 System Performance

In this section, we test our system with two sets of experiments and evaluate the performance of each experiment.

3.1 Accuracy

We called 20 volunteers to use IRI and obtain the evaluation as shown in Figure 2 according to volunteers' scores. We can find that IRI achieve a good performance in recommending. When there is only one keyword, IRI has a higher error rate because it is more difficult to recommend some images with little information. As the number of keywords increasing, error rate curve gets decreasing and smooth.

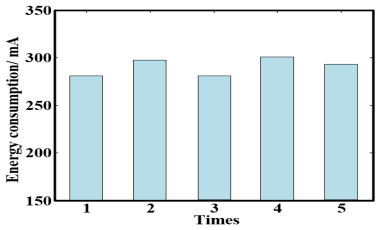

Figure 3. Energy consumption: We test energy cost 5 times on LETV mobile phone.

3.2 Energy Consumption

We also test the energy consumption to evaluate the possibility to implement IRI on the mobile phone. Here we test it on LETV mobile phone and we experiment for 5 times to evaluate its energy consumption per hour. We report the energy cost of mobile device with IRI in Figure 3. It will cost 290mA per hour on average when IRI processes once a time, so we insist IRI could be fully supported by mobile device.

4 Conclusions

In this paper, we propose an IRI, which can predict user intent by analyzing text information input by user. It constructs a multi-layer semantic relation library to model relation of images class in user's mobile. Then it Extracts keywords from user input by using TextRank algorithm in jieba. At last, IRI recommends images with related ranks. Through these three steps, IRI avoids user manually select images in mobile, achieves a good recommendation and then makes user use mobile phone in a more convenient way.

5 Acknowledgments

This work is supported by Project NSFC (61602381, 61501372, and 61672428), China Postdoctoral Science Foundation (2017M613187 and 2017M613186), and Natural Science Basis Research Plan in Shaanxi Province of China (2017JM6074).

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Table 1. Experiment setting

Mobile device	LETV mobile phone
Energy consumption	AnTuTu Benchmark
Storage space	LETV 16G
Volunteers	20
Platform	Wechat
Images classification	LETV mobile phone
Text input	LETV mobile phone

Experimental Environment

In experimentwe make settings as Table1 shown. Specifically, IRI was implemented on LETV mobile phone with 16G storage space. AnTuTu Benchmark was used to measure energy consumption. Wechat was took as social platform to process images recommendation with users' intent. Finally, we call for 20 volunteers in experiment for evaluation. Also we will have a demo of video at the conference.