

IMAGE BASED INFORMATION ACCESS FOR MOBILE PHONES

Chen X¹., Koskela M¹., Hyväkkä J².

1 Adaptive Informatics Research Centre, Aalto University School of Science and Technology

2 Media Technologies, VTT Technical Research Centre of Finland

xi.chen@tkk.fi



Aalto University
School of Science
and Technology

Abstract

Mobile phones with integrated digital cameras provide new ways to get access to digital information and services. Images taken by the mobile phone camera can be matched to a database of objects or scenes, which enables linking of digital information to the physical world. In this demonstration, we present a prototype system for image based linking of photos taken from pages of magazine. The system is intended not just for the high-end smartphones but for the current mainstream of camera-equipped mobile phones. The proposed system consists of a full architecture for a practical application developed in close collaboration with a magazine publisher.

1. Introduction

This paper describes a research prototype system aimed at linking of images taken with a mobile phone to interactive and contextual mobile services. This kind of technology can be used for various purposes and it enables linking of the digital information to the physical world. Possible application areas include outdoor advertising, magazine and newspaper advertising, tourist applications, and shopping. In this paper, we focus on a use case with a magazine publisher as the content provider.

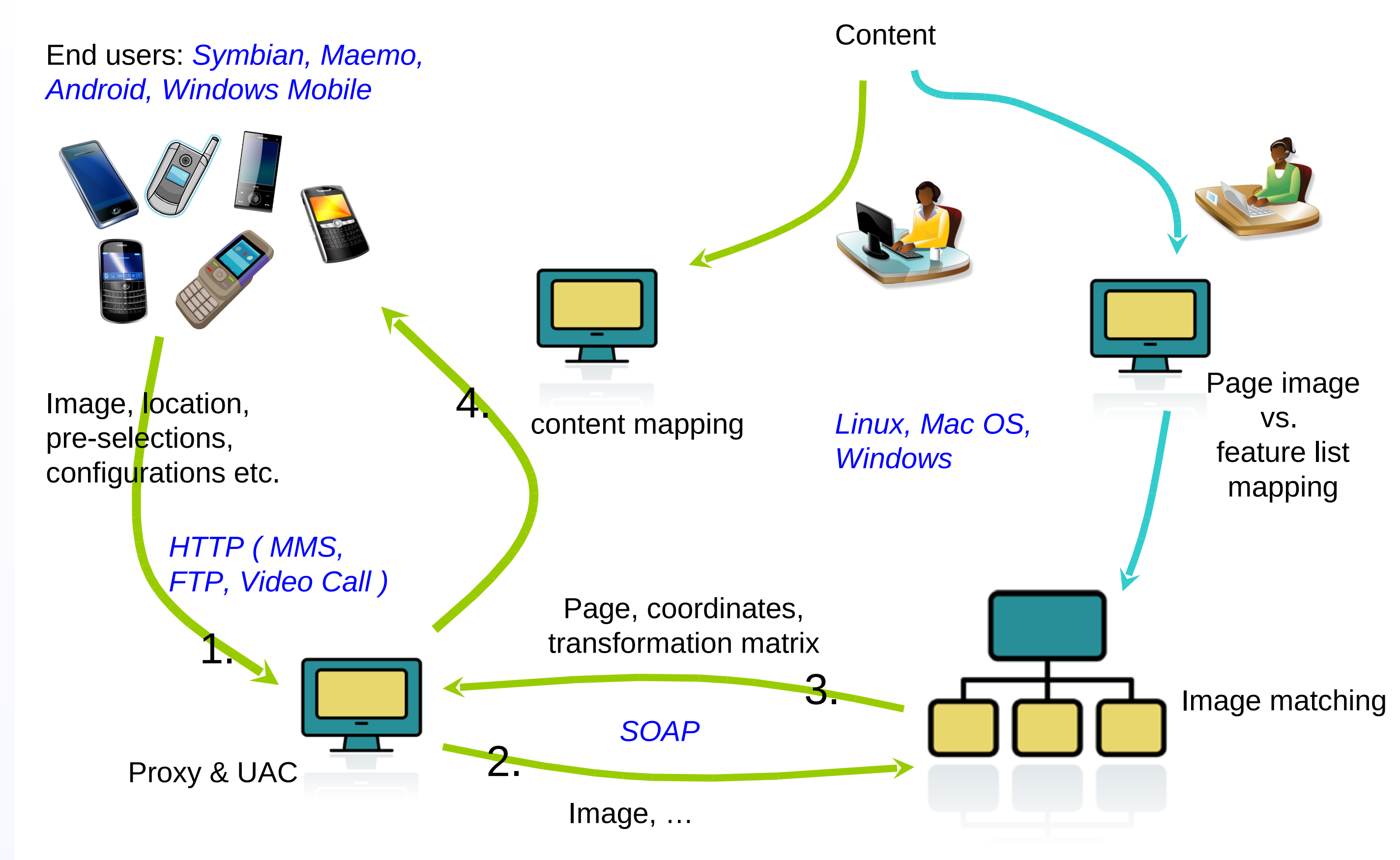
3. Image Matching

The image matching algorithm is based on pair-wise matching of local features using the SIFT descriptors. The pair-wise matching is implemented using approximate nearest-neighbor search by a hierarchical k-means tree with 32 branches, and the resulting correspondences are verified using a geometric consistency check. Each issue of a magazine is considered as a single entity, and the database consists of several entities depending on the number of magazine issues included in the application.

4. Conclusion

The required resolution for the database images poses a serious challenge. Currently, the system can handle a small number of magazine issues with a tolerable latency of a few seconds.

2. System Structure



The image recognition and the content retrieval processes start when the user takes a photo of a magazine page with a mobile phone application and sends it for instance as a multimedia message (MMS) to the recognition system. The image transfer is handled with a dedicated application which can add more features to the service.

The query is first processed in a proxy server. The data from the query is filtered and the image is forwarded to an appropriate image matching service using the SOAP protocol.

The image matching block returns the matching results, consisting of the matching magazine issue, page number, x and y coordinates, and the transformation matrix. The results are mapped to the related content, such as additional information, news, and videos, provided by the publisher. Links to the related content are then returned to the user's mobile phone.

The image matching database has to be constantly updated by adding new magazines and deleting the old ones. So does the additional content provided by the publisher.

References

D. G. Lowe. Distinctive image features from scale-invariant keypoints. International Journal of Computer Vision, 60(2):91-110, November 2004.