Images Processing and Analysis for Mobile Terminals

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Abstract:

Rapid emergence of diverse access technologies, e.g. 3GPP cellular networks, WLAN, Bluetooth, DVB-H (Digital Video Broadcasting-Handheld), etc. had result in croissant demand to access the Web and Internet resources any when, any where and using any terminal. Multimedia resources and formats are also in constant evolution; they vary from different textual formats, to images, videos and complex animations. Many commercial applications start to be proposed to realise the emerging demand starting from IBM's Websphere Transcoding Publisher to Google Pack and Yahoo Go services. This paper discusses a new framework that includes a set of techniques for images processing and visualisation for mobile terminals. The system considers diverse access technologies to deliver the best possible services to mobile users, taking into account both the user device limitations (interaction and accessibility) and bandwidth efficiency. This leads to allow users to connect through a variety of devices, anywhere, at a wide range of speeds.

The work is based on the results of the NAC architecture [2] that we have implemented in previous works and implies the environment of wireless networks. The proposed framework is discussed at four levels: (1) images processing and analysis, (2) semantic enrichment of the images base, (3) context aware delivery and (4) delivery evaluation in different kinds of wireless networks.

Real-world applications of computer vision that handle large size images with a high quality such as satellite images based systems, medical radiography images and GPS systems require a quick images retrieving and whole exploring of the images of large datasets. Moreover, such applications do not support the distortion of the original images quality. To satisfy such requirements, our approach applies a real-time subdivision of the images to different parts and delivers the images parts on-demand to the user. Image parts (areas or regions) are calculated and extracted in a real-time way; no preliminary extraction is done to avoid the exploding size problem due to the infinite number of possible subdivisions. The way of subdividing images depends to: a) the terminal display size, b) the user interaction/navigation within the different parts of the image and c) the wireless network characteristics. The user can navigate into the original image stored in a remote server and scroll up, down, left or right the image. Also, he can interact with the different regions of the image based on the semantic of its searching query that can concern one or more region of the image. Our framework investigates the problem of transmitting images in wireless networks where we observe different types of distortions on image. Coding artefact and packet loss during transmission could result in a degradation of the quality of an image. We have made attempt at exploring the performance of distributed image compression in different kinds of wireless networks (GPRS, 802.11, UMTS, WiMax, Mesh networks). The image quality is measured using the Peak Signal-To-Noise [3] which represents the pixel wise squared difference between a reference (undistorted) image and a degraded version.

RDF (Resource Description Framework [1]) model is used to add semantic information into images of the dataset in order to enable querying and searching the images from mobile terminals. The Universal Profiling Schema (UPS) model [2] is used to provide a network and device independent delivery of the images.

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