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Application for The Analysis and Browsing of Images – Use Case: A Public Photo Archive

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Motivation

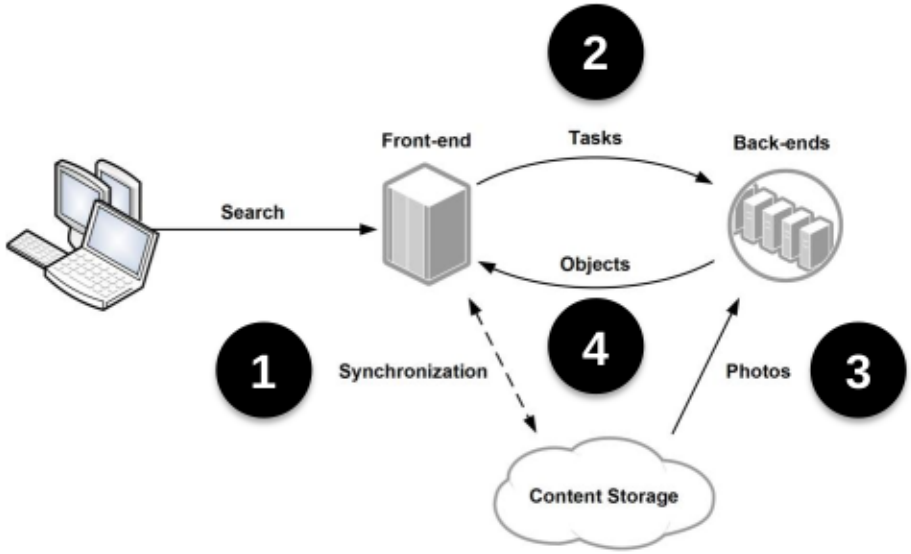
- In recent years commercial products for automatic image annotation have emerged
- Solutions are often closed-source
- Customization can be challenging

Goals

- Describe a structured format for media objects detected from multimedia content
- Create easy-to-use user interface for browsing content
- Validate the usability of the photo service

Simplified System Architecture – Analysis

1. Synchronize metadata with the front-end
2. Tasks are created on the front-end containing details needed for retrieving content from the storage
3. Photos are directly accessed by the back-ends
4. Objects are returned by the back-ends, and indexed on the front-end



Simplified System Architecture – Search

- User can perform a content-based search by providing a service-known photo identifier…
- … or by directly uploading an example photo

- Additionally, user can search indexed content based on the objects generated by the back-ends

The Objects

- Objects are
  - Faces
  - Keywords (tags)
  - Key-value paired metadata (e.g. Exif, 3rd party imported data)
  - “Uncategorized” objects

Formats and Interfaces

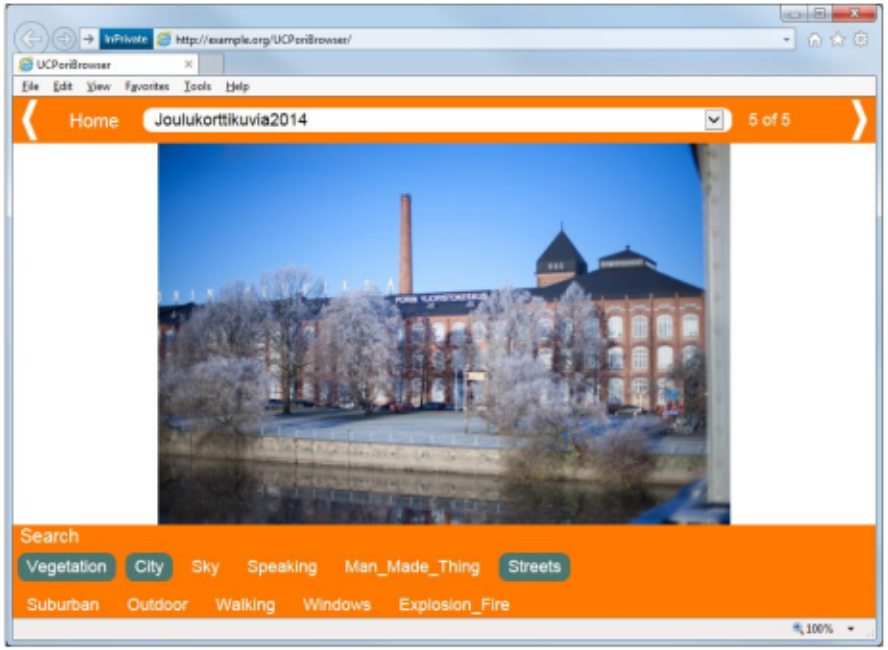
- Access to content storage and other 3rd party services (synchronization) is implemented using the service-specific interfaces and formats
- Client and back-end APIs utilize a unified XML-based format
  - Simplified examples are included in the paper
  - Full specification is available on project's source code repository (GitHub)

Use Case:
Photo Browser

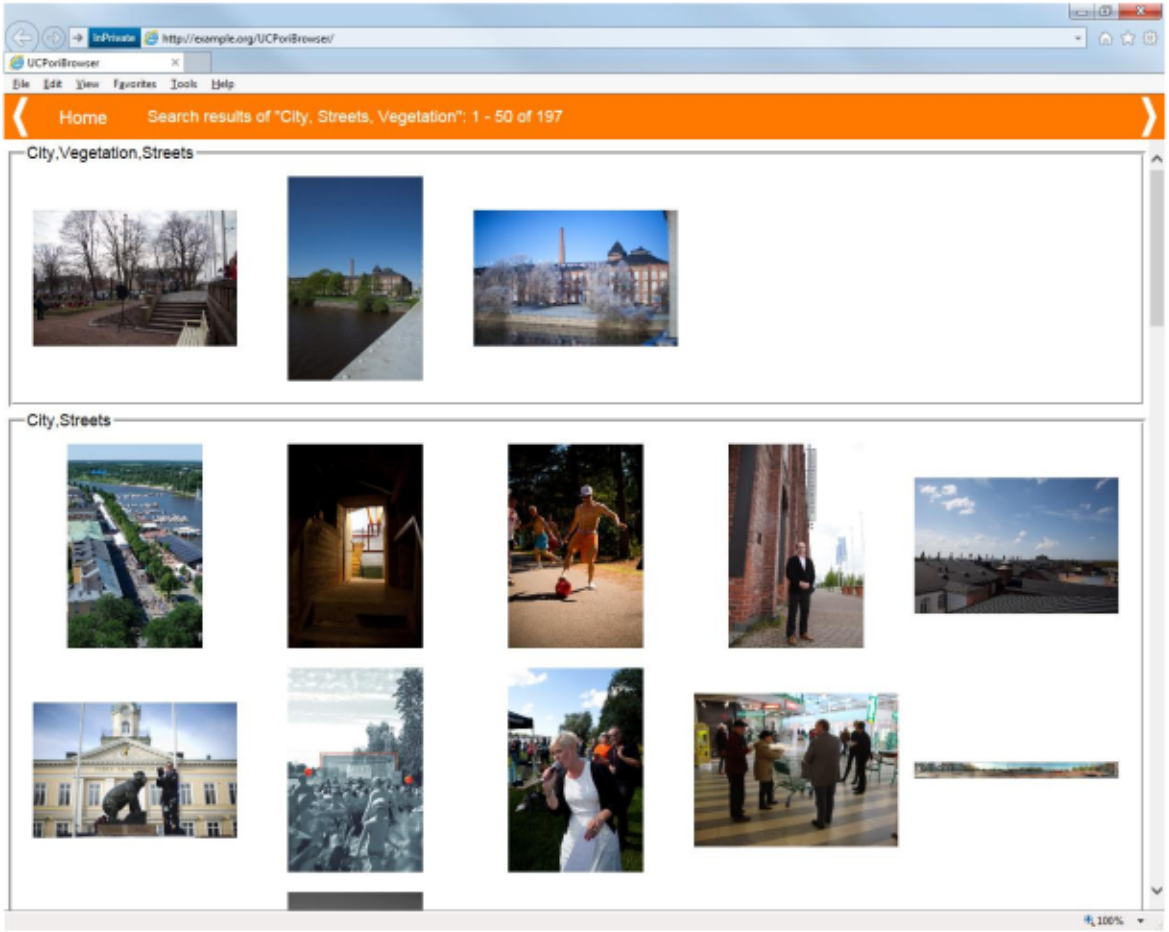
- Thousands of photos on university's private repository
- Searching can be challenging
  - Lack of tags
  - *What* is in the photos?
  - *Who* are in the photos?
- Need to find specific types of photos to be displayed on public channels (Instagram, Twitter, Facebook, university web page)

The Photo Browser

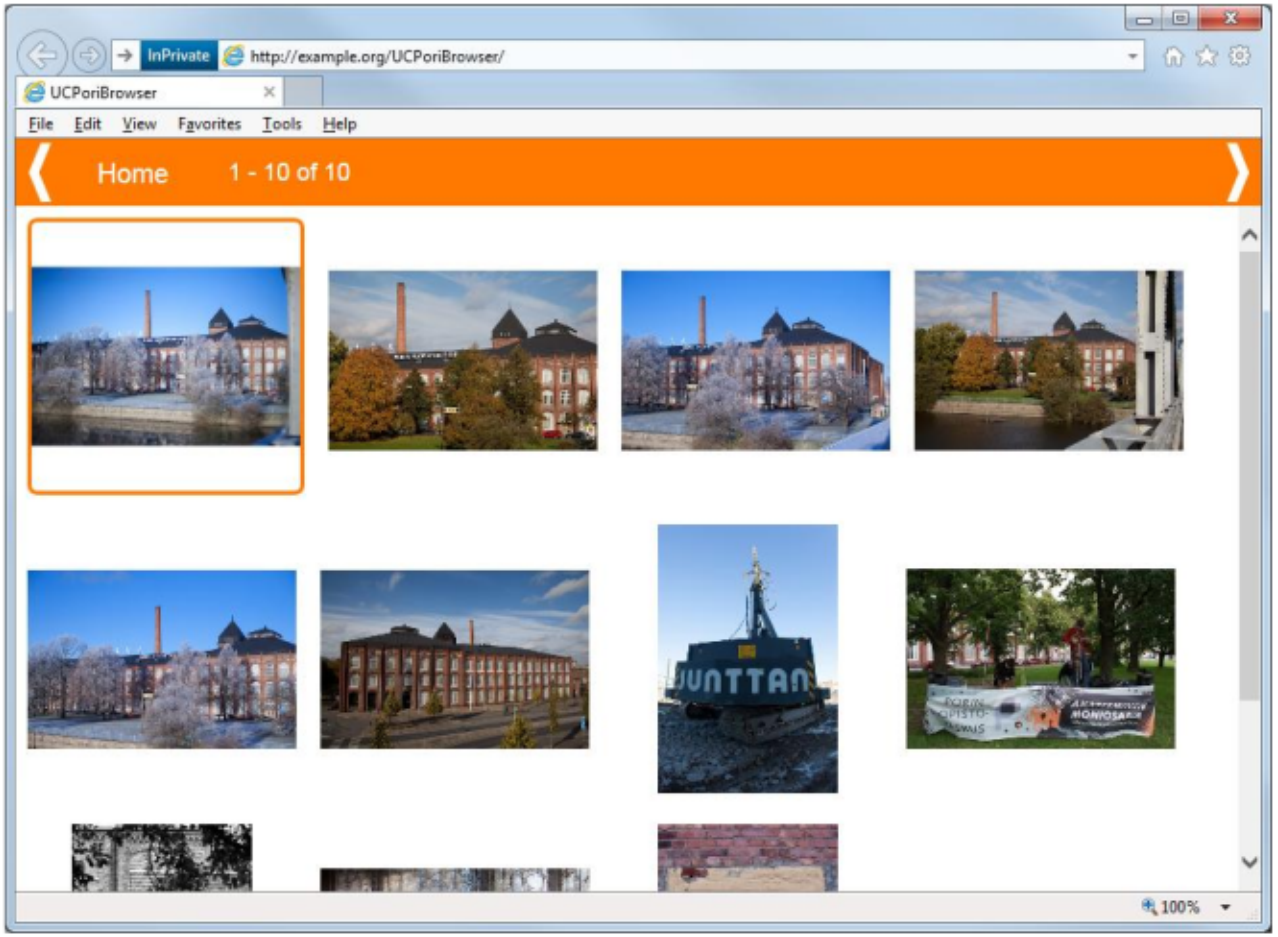
- HTML-based client
- Utilizes JavaScript to access REST APIs
- Search objects are constructed based on the user actions



The Photo Browser
Object Search Results



The Photo Browser
Similarity Search Results



Challenges and Future Studies (1/3)
Challenges in Result Comparison

- Slight differences in results produced by individual back-ends
  - There is no easy (and exact) way to compare and sort the results
- Current implementation does not allow combination of object and similarity search

Challenges and Future Studies (2/3)
Challenges in Face Detection

- A vast amount of unknown people are present in the photos

- Potential legal and privacy issues of "tracking and detecting" of people

Challenges and Future Studies (3/3)
Challenges in Keyword Selection

- Back-ends produce a pre-defined set of keywords based on the provided learning models (reference templates)
  - Not practical to generate exceeding amount of keywords
  - Some keywords are difficult to generate (e.g. abstract concepts, emotions, etc) even though they are often used in spoken language
  - *Which* keywords to select to be used in the service?

- Ranking and user feedback can reduce the amount of undesired keywords
  - How to construct the initial keyword set?

Thank You!