대용량 및 고 정확 이미지 검색 기술 튜토리얼

Sung-Eui Yoon
(윤성의)

Course URL:
http://sgvr.kaist.ac.kr/~sungeui

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About the Instructor

- Joined KAIST at 2007
- Notable recognitions
  - Organized tutorial on image search at CVPR
  - Worked with Adobe, Naver, Hancom, etc.
  - Produced a professor on image search (SKKU)
  - Received next-generation scientist award (IT category) at 2019 from S-Oil and Korea Academy of Science
- Related materials
  - Paper and video: http://sgvr.kaist.ac.kr/publication
  - YouTube videos: http://www.youtube.com/user/sglabkaist

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Research Theme: Scalable Ray Tracing, Image Search, Motion Planning

- **Designing *scalable techniques* to efficiently handle massive models on commodity hardware or clouds**

Photo-realistic rendering

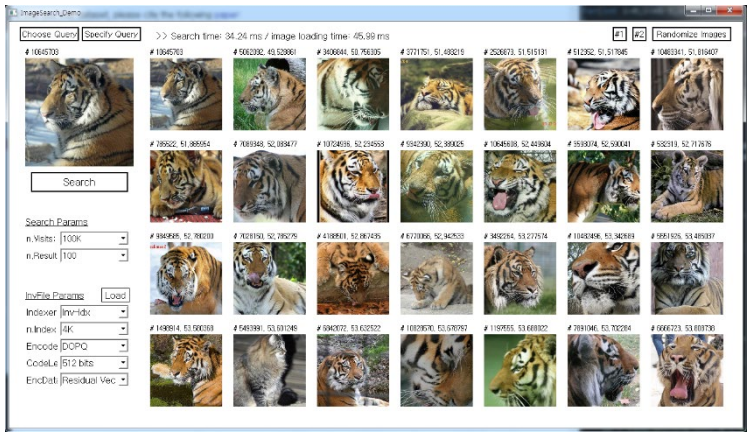

Image search

Motion planning

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Results of Image Search

- **Collaborated with Adobe, NAVER, Hancom**
  - **11M images**
  - **Use deep neural nets for image representations**
  - **Spend only 35 ms for a single CPU thread**

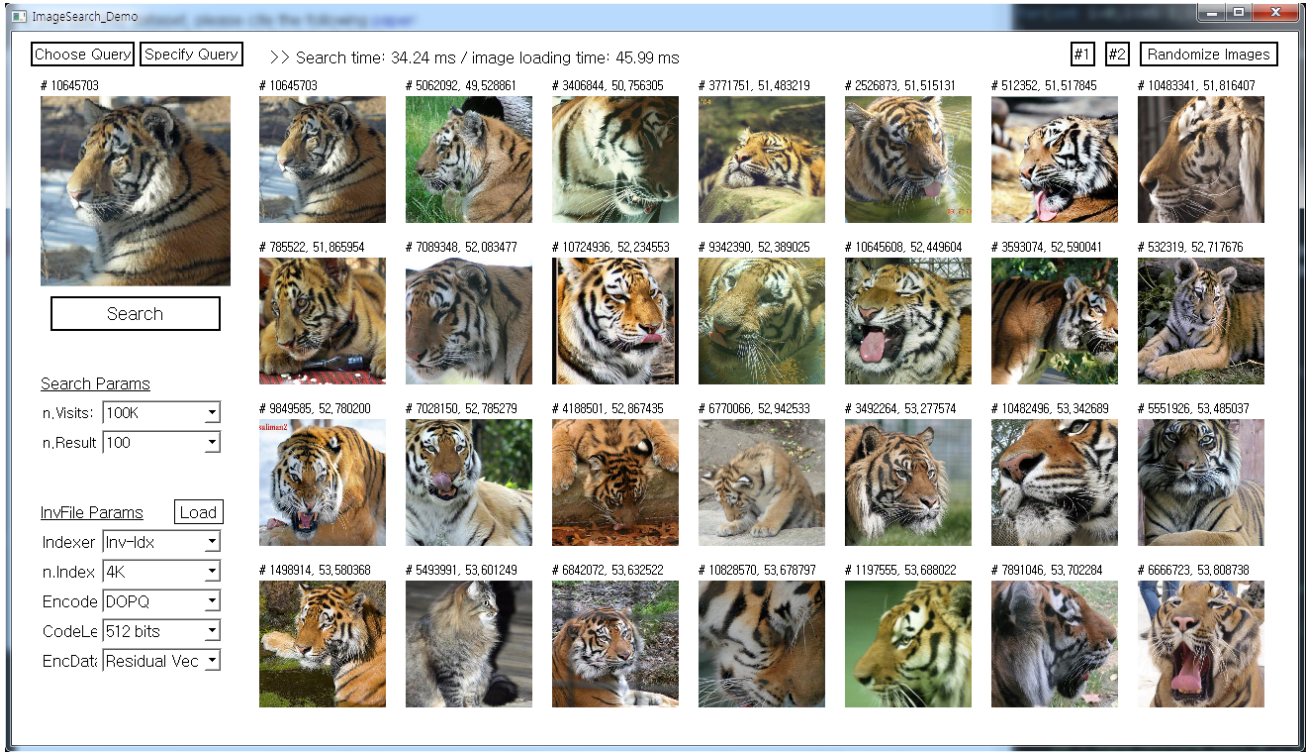

Image Search or Content-Based Image Retrieval (CBIR)

- **Identify similar images given a user-specified image or other types of inputs**

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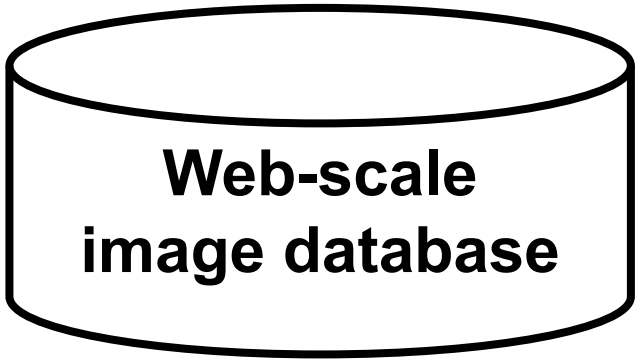
Image Search

- **Identify similar images given a user-specified image or other types of inputs**

Extract image descriptors (e.g., SIFT or CNNs)

Input



Output

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www.google.com/search?q=apple&hl=en&biw=1024&bih=600&prmd=ivnsu&source=lnms&tbm=isch&ei=zxpNTv7bN8_OrQeB9v

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About 177,000,000 results (0.46 seconds)

Advanced search

SafeSearch moderate ▾

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Sort by relevance
Sort by subject

Any size
Large
Medium
Icon
Larger than...
Exactly...

Any color
Full color
Black and white

Related searches: apple **iphone 5** apple **logo** apple **wallpaper** **red** apple apple **background** apple **mac**

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About 4 results (0.29 seconds) Advanced search

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120 × 140

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이름Cha, Meeyoung (차미영) 조교수; 연구분야Social Computing, Data-Driven Social Science; 학위PhD, KAIST, 2008; 전화번호+82-42-350-2922; 이 메일meeyoungcha ...

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Applications

- Search
- Image stitching
- Object/scene/location recognitions
- Robot motion planning
- Copyright detection

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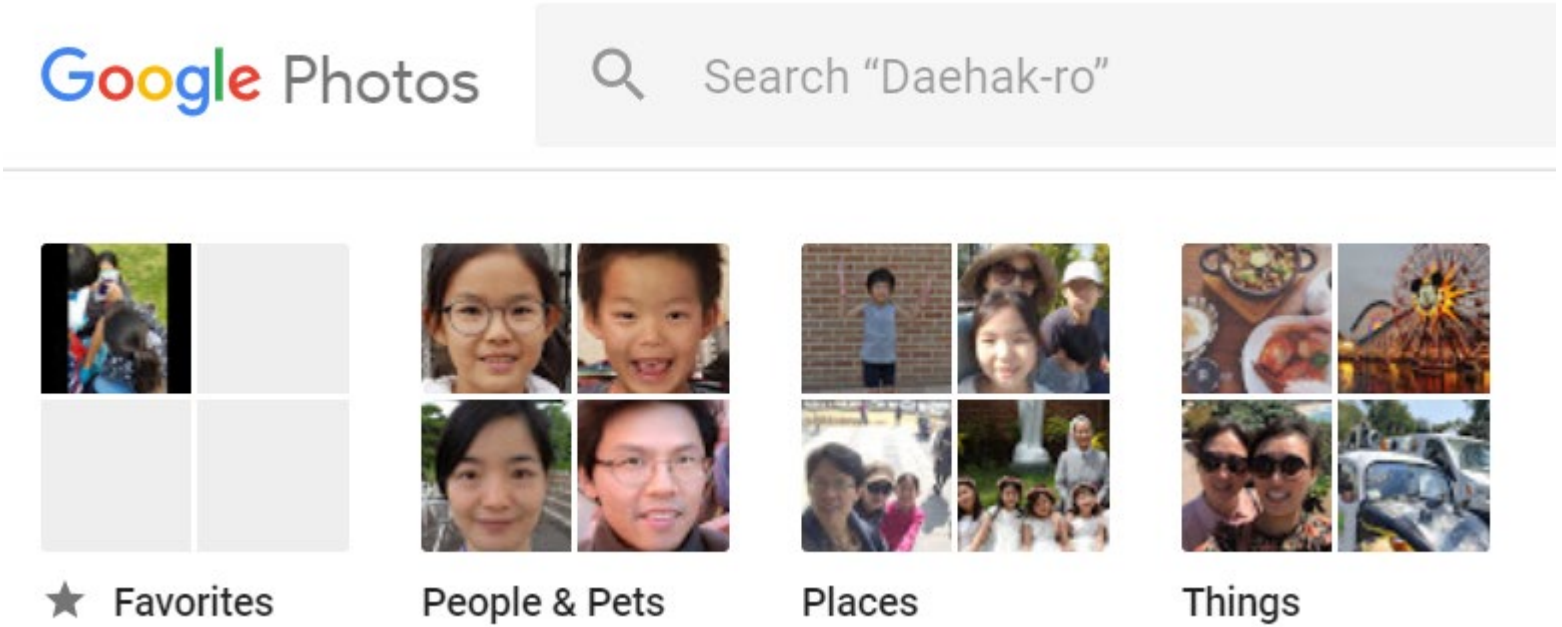
Google Photos and Many Search Functionality



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Cross Domain Image Search

- **Visual similarity across image domains**

Shrivastava et al., SIGA

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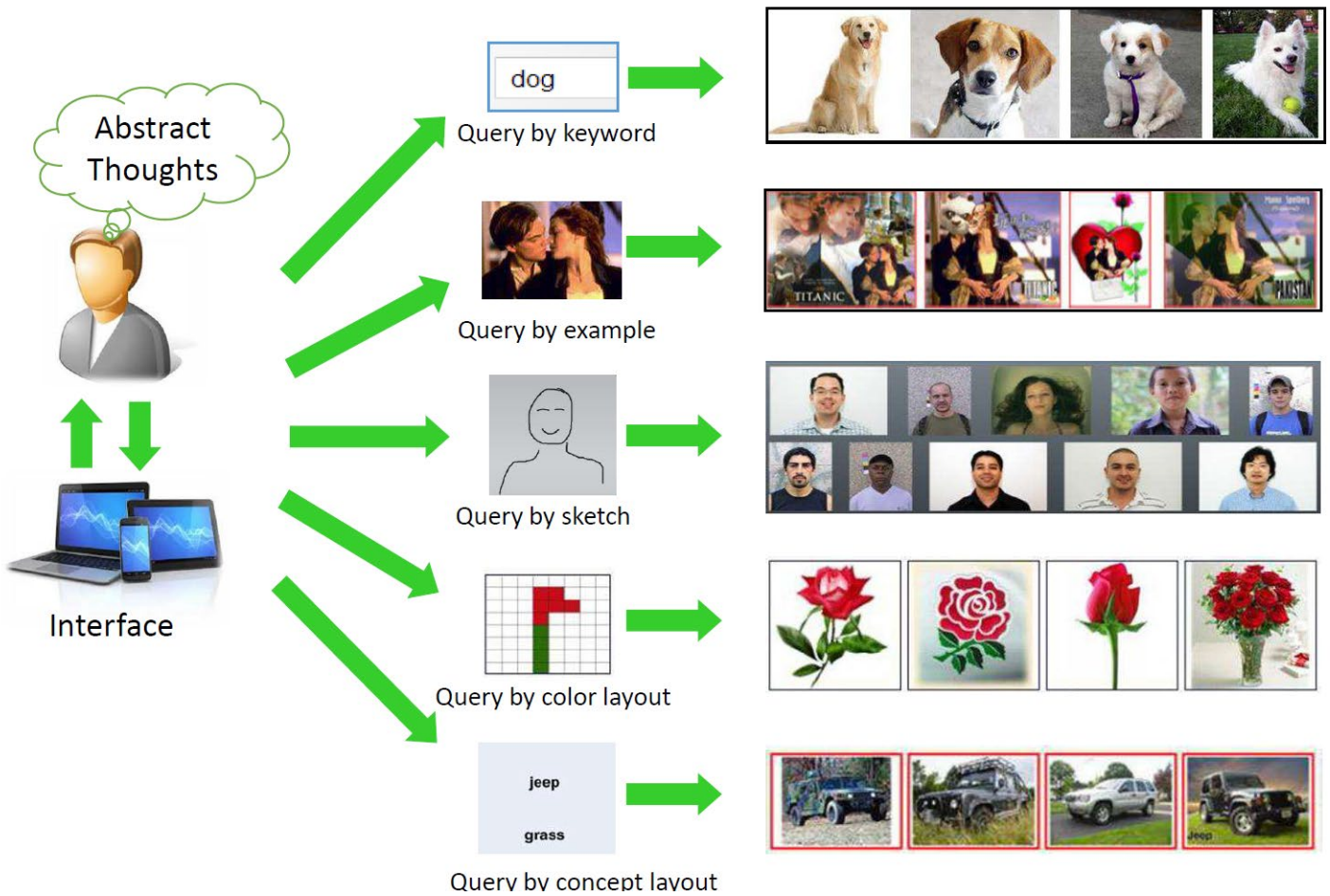
Different Search Scenario



Zhou et al., arxiv

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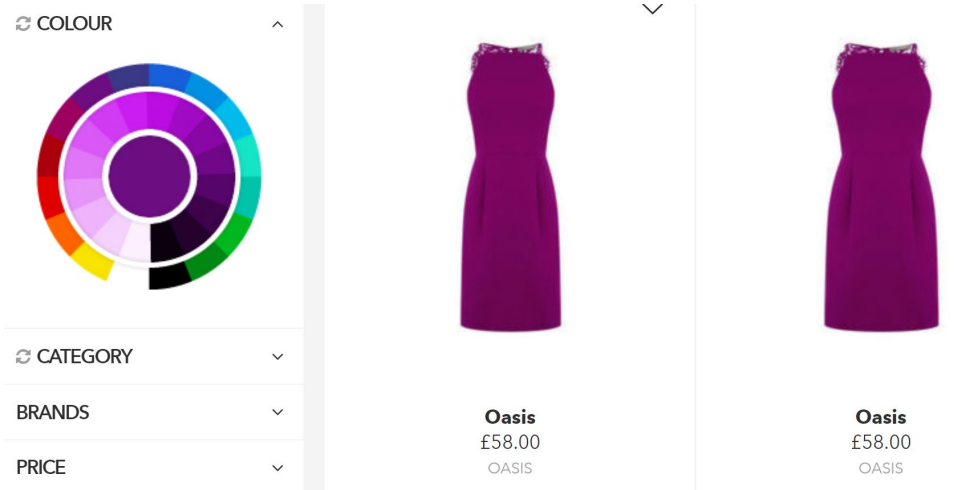
Some Image Search Companies

Based on near duplicate image search



Snap fashion

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Some Startups

- 학생 창업
  - 클디, **2011**년 창업

클디 팀원들, 왼쪽부터 김효은 연구원, 백승욱 CEO, 이정인 CTO

기술기반 스타트업으로서 좋은 모범 사례를 남기고 싶다

Landmark or Location Detection

query

City-scale image DB

Chen et al. KAIST

3D Reconstruction

- **Conducted by feature matching among many images**

Photo tourism

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Example: Transfiguring Portraits [SIG. 16]

Time-Lapse Photography and Edit Transfer [Shen et al.]

Figure 1: *Our regional foremost matching for Internet images estimates accurate regional correspondence and enables several applications.*

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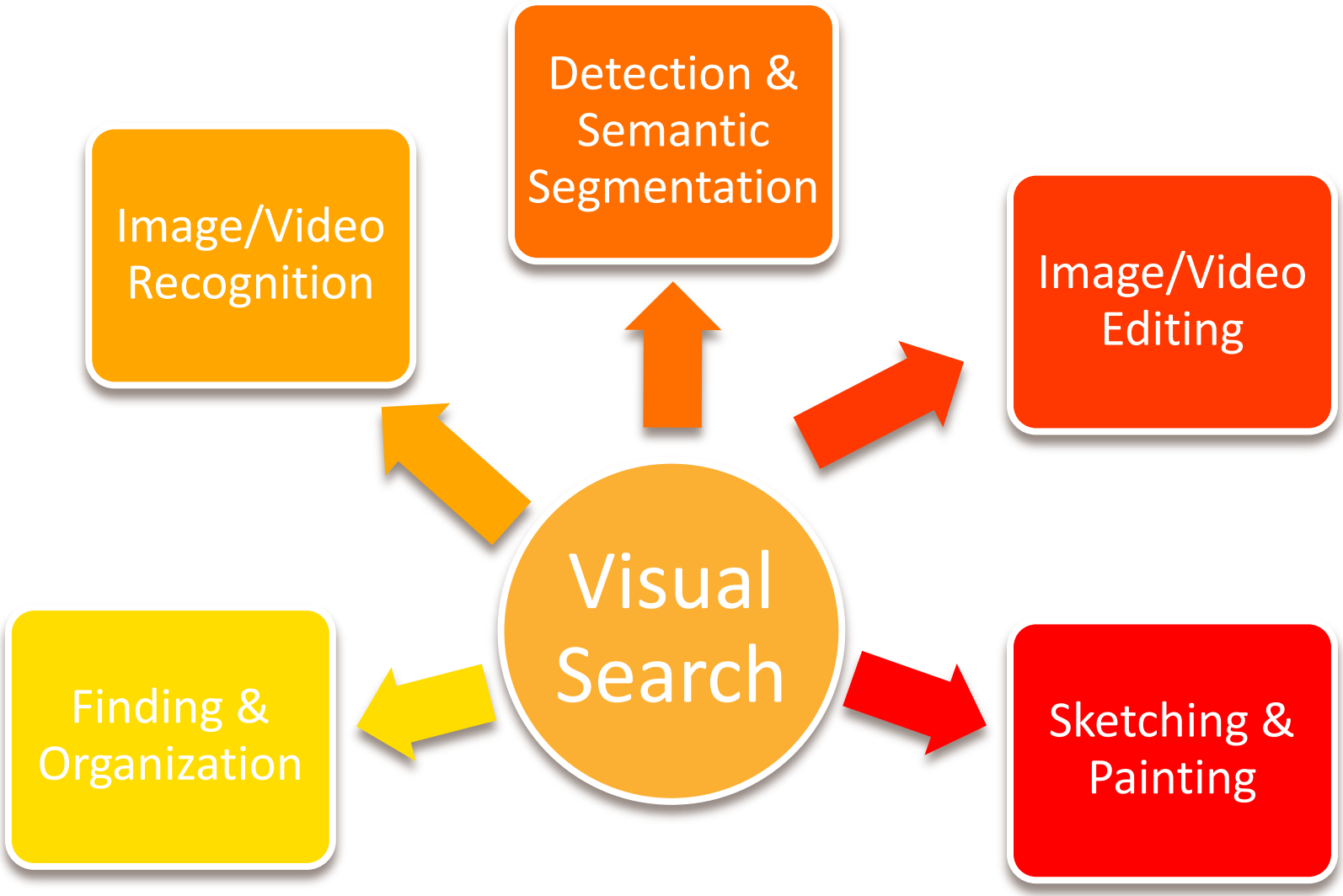
Possible Application Domains



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Adobe

Web-Scale Visual Data and Novel Applications

- **Visual data are getting more widely used in our daily life**
  - **YouTube, Facebook, Flickr, etc.**
- **Many challenging issues**
  - **Processing them requires scalable algorithms**
  - **Web-scale visual data can enable new applications (e.g., photo tourism)**
  - **Achieving high accuracy, each search UI, etc.**

Ack.: Hays

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Google JPG × eiffel tower

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Best guess for this image: ***eiffel tower***

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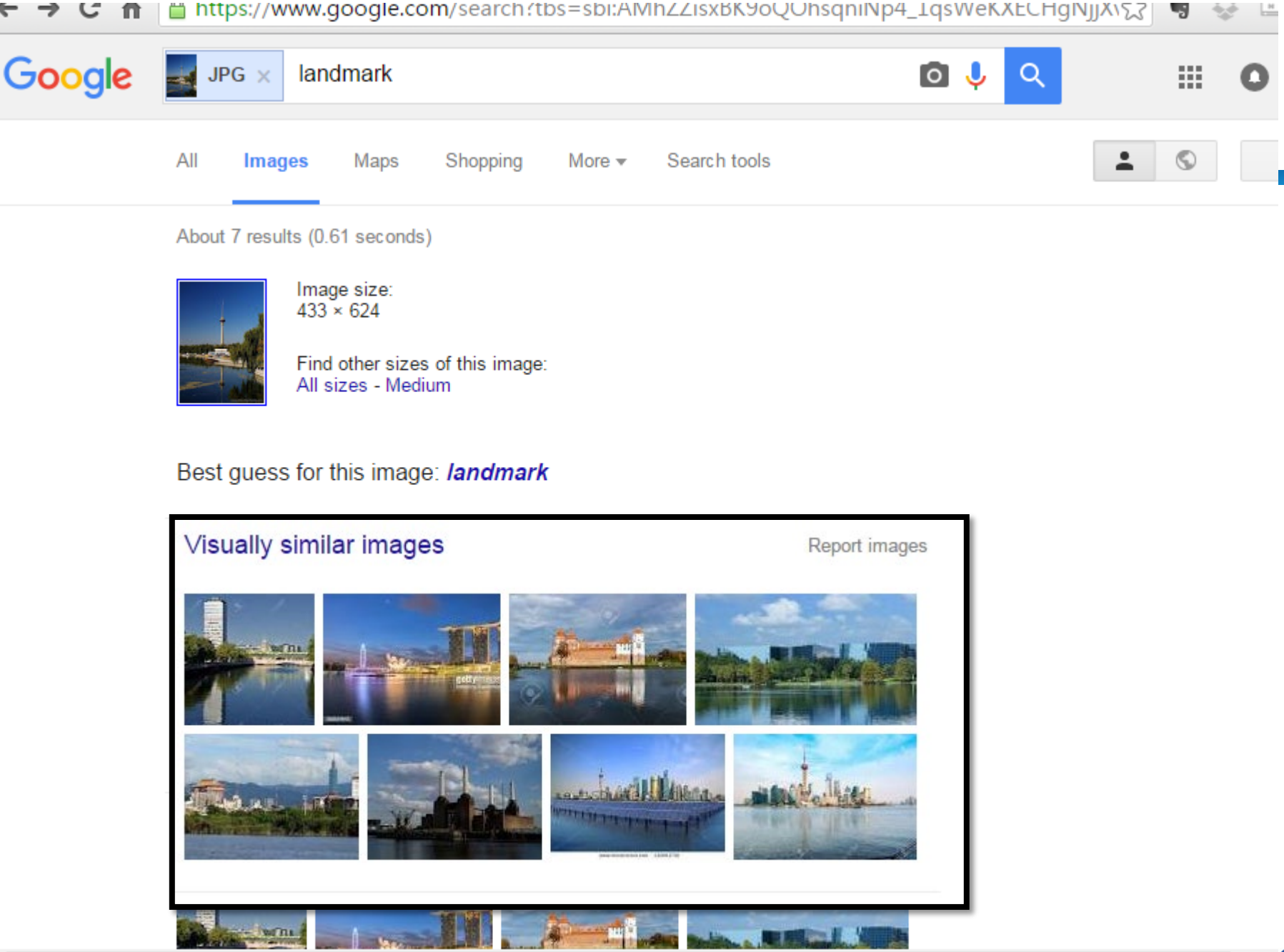
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Image size:
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Visually similar images
Report images

Tutorial Overview

- **12.22(수) 9:30-12:00**

- **9:30: Introduction (윤성의)**
- **9:50~10:30: 최근 딥러닝 기반 이미지 검색 기술에 대한 소개 (김재윤)**
- **10:30: 10분 break**
- **10:40: Recent Advances in Person Re-identification for Real-world Scenarios (조윤기)**
- **11:20: Hypergraph Propagation and Community Selection for Objects Retrieval, (Guoyuan An)**

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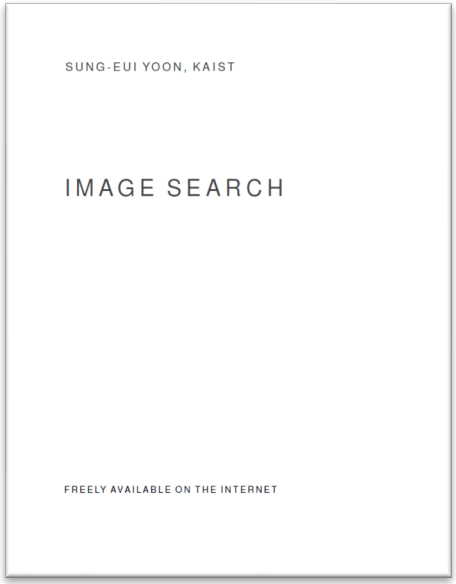
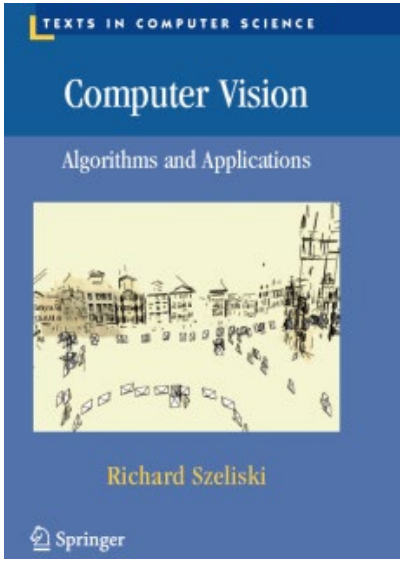
Resource

- My ongoing draft on image search
  - pdf file is available at the webpage
  - https://sgvr.kaist.ac.kr/~sungeui/IR/
- Reference
  - Computer vision: algorithms and applications
    - Its file is available (http://szeliski.org/Book/)





Other Resources

- Technical papers
  - CVPR, ICCV, ICLR, NeurIPS, ICMR, ACM MM, SIGGRAPH, etc.
  - Youtube (technical talks)
  - Computer vision resource (http://www.cvpapers.com/)
  - Multimedia information retrieval (http://www.mirsociety.org/mweb/)
- Course homepages
- Google or Google scholar

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