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A Scheme of Fragment-based Faceted Image Search

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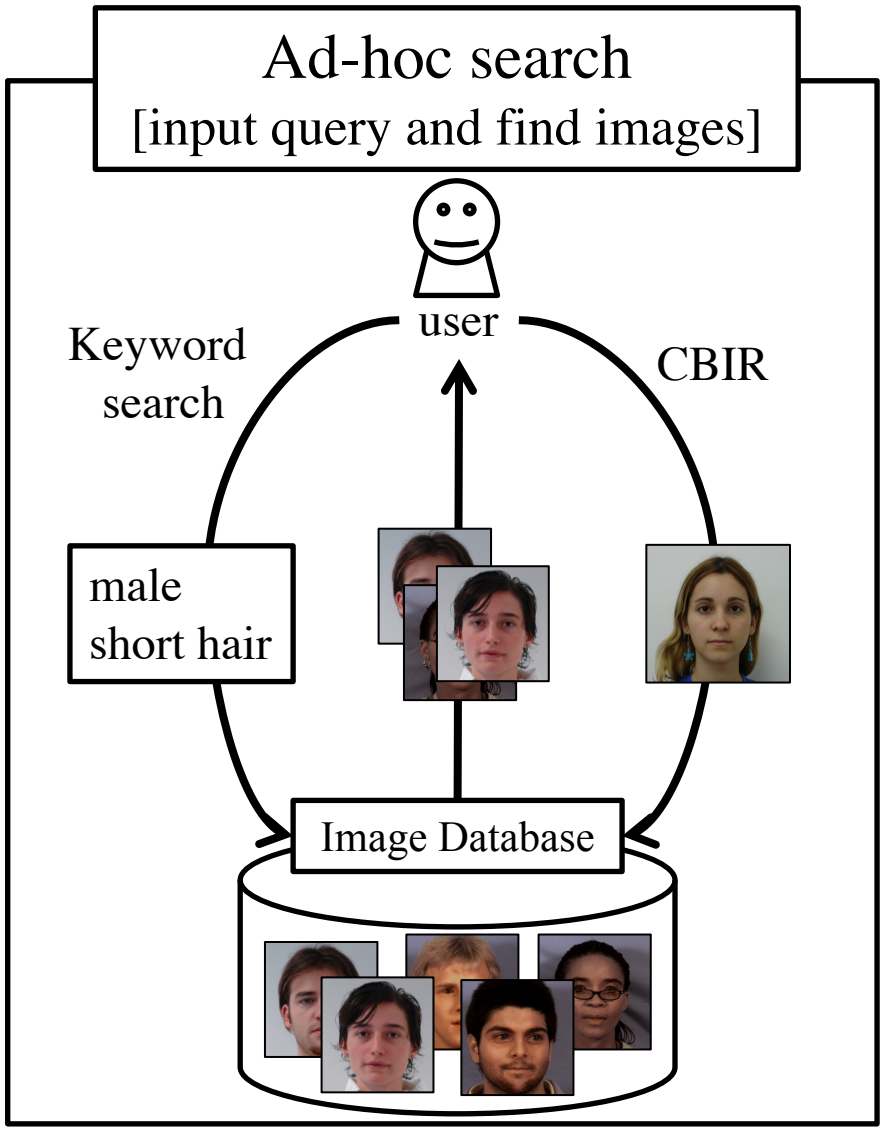
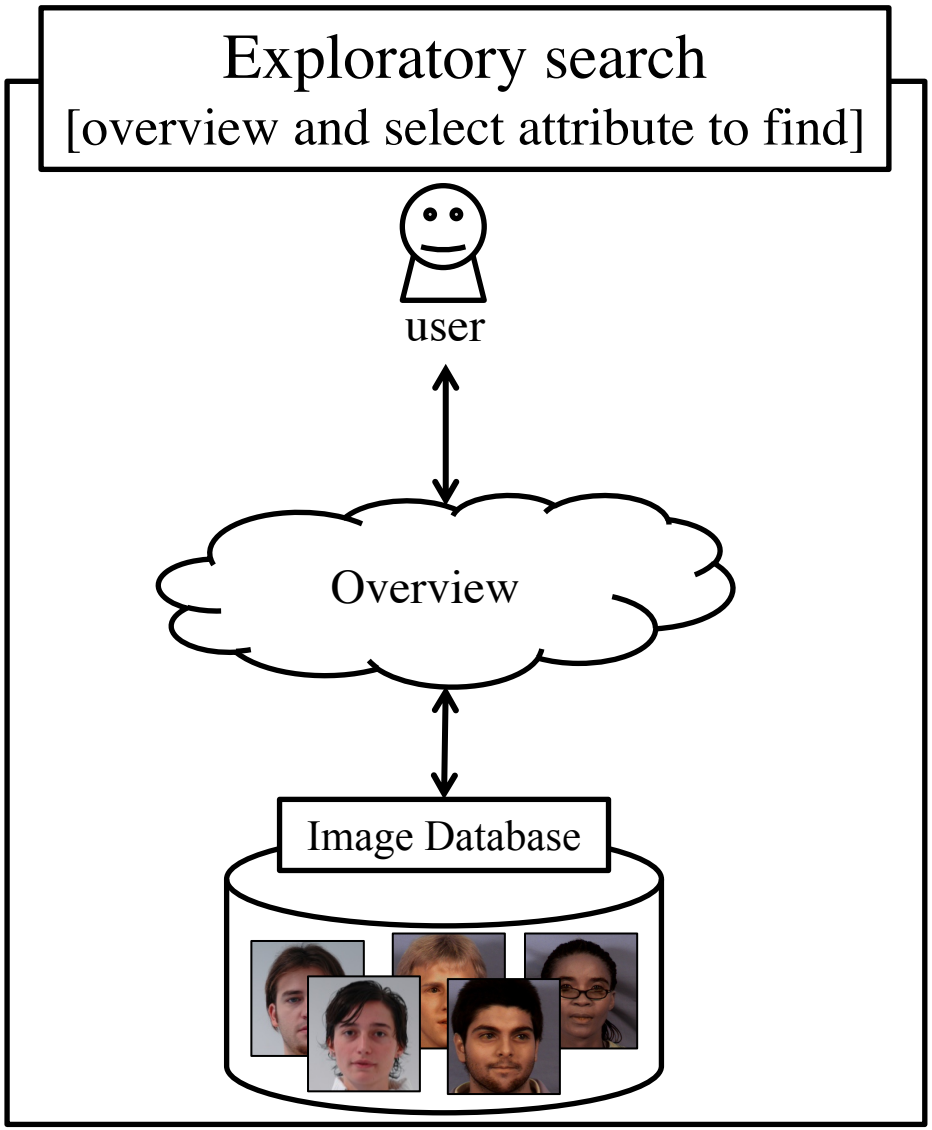
Background

- Increasing number of images
  - devices: digital camera, scanner
  - services: Flickr, Picasa, Facebook, Twitter

- Conventional image searches
  - Keyword search
  - Content based image retrieval (CBIR)

Search motivations





Faceted search

- One of exploratory search
  - searching by selecting pairs of a facet and a value
- Used in navigational interfaces
  - e.g. Amazon, eBay, DBLP, IEEE Xplore

Facet

Make	Count
Honda	3
Toyota	2
Suzuki	2

Year	Count
2009	3
2010	2
2011	2

Color	Count
Red	3
Blue	3
Black	1

Car database

Make	Year	Color
Honda	2011	Red
Honda	2009	Blue
Honda	2009	Black
Toyota	2010	Blue
Toyota	2009	Red
Suzuki	2011	Red
Suzuki	2010	Blue

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Facet

Make	Count
Honda	3

Year	Count
2009	2
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Color	Count
Red	1
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Black	1

Car database

Make	Year	Color
Honda	2011	Red
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Related work: faceted search for images

- Yee et al., CHI 2003

  "Faceted Metadata for Image Search and Browsing"

  – Facets are constructed from metadata of images

- Zwol et al., WWW 2010

  "Faceted Exploration of Image Search Results"

  – Facets are constructed from user query logs.

These works still depend on textual information, i.e. metadata and query logs.
Problem:

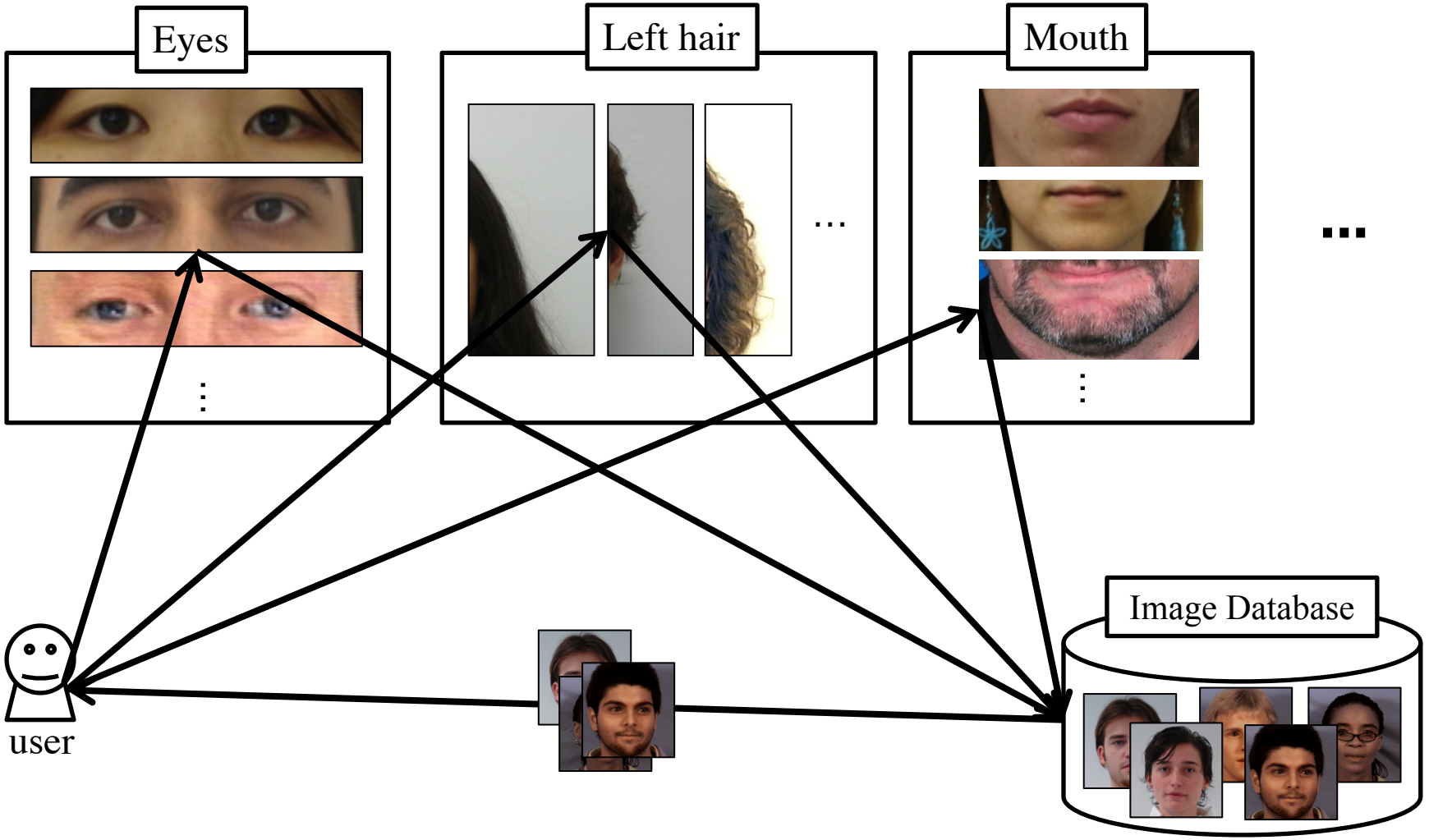
- the case images have no metadata / junk metadata can easily happen
- query logs are not always available

Motivation and basic idea

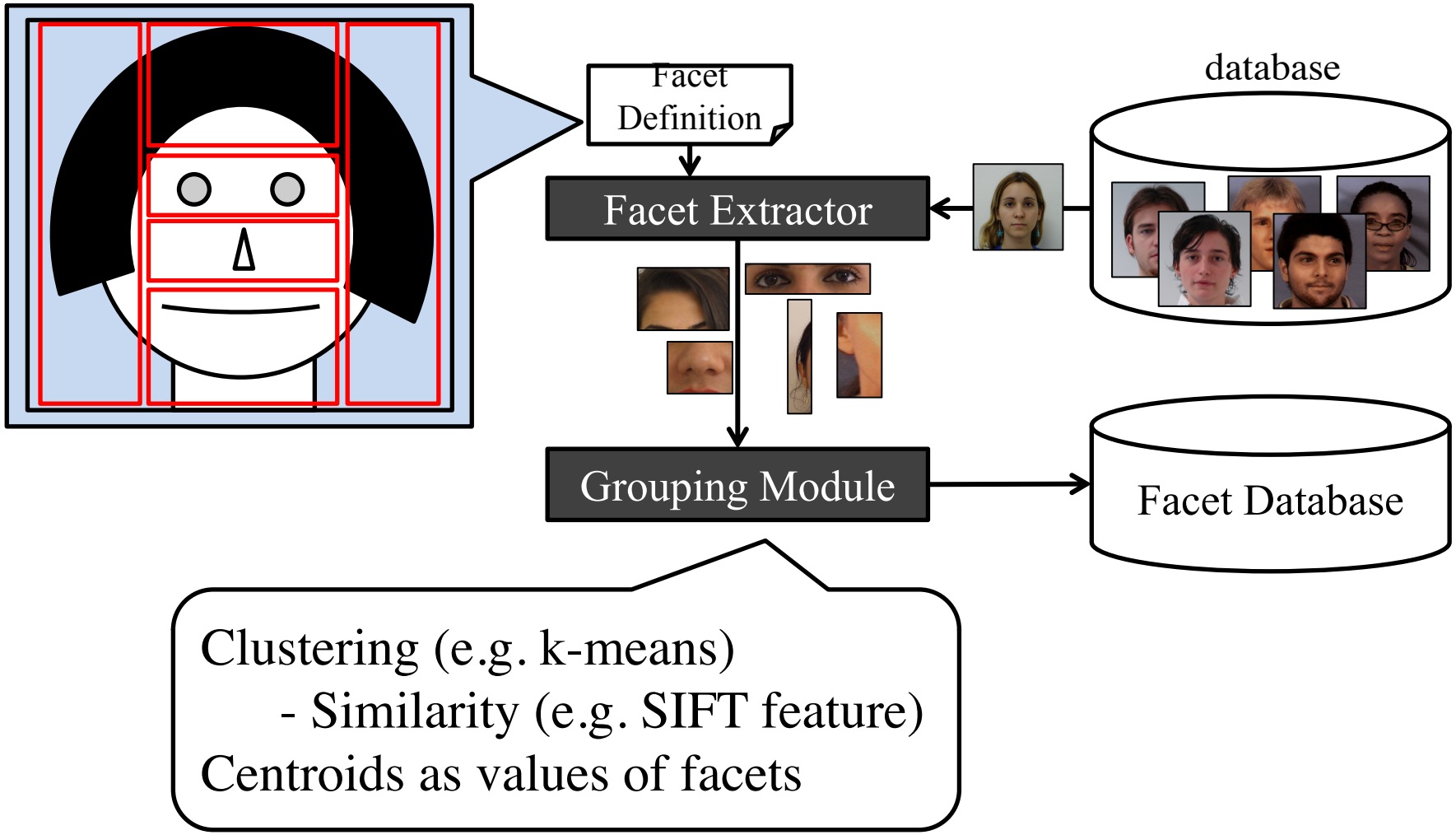
- Motivation
  - Assumption: no textual information available
  - Goal: faceted search for images

- Basic idea
  - inspired from *montage*
    - montage: the process of making a composite image by cutting and joining a number of other images
  - use common parts of images as facets

An example



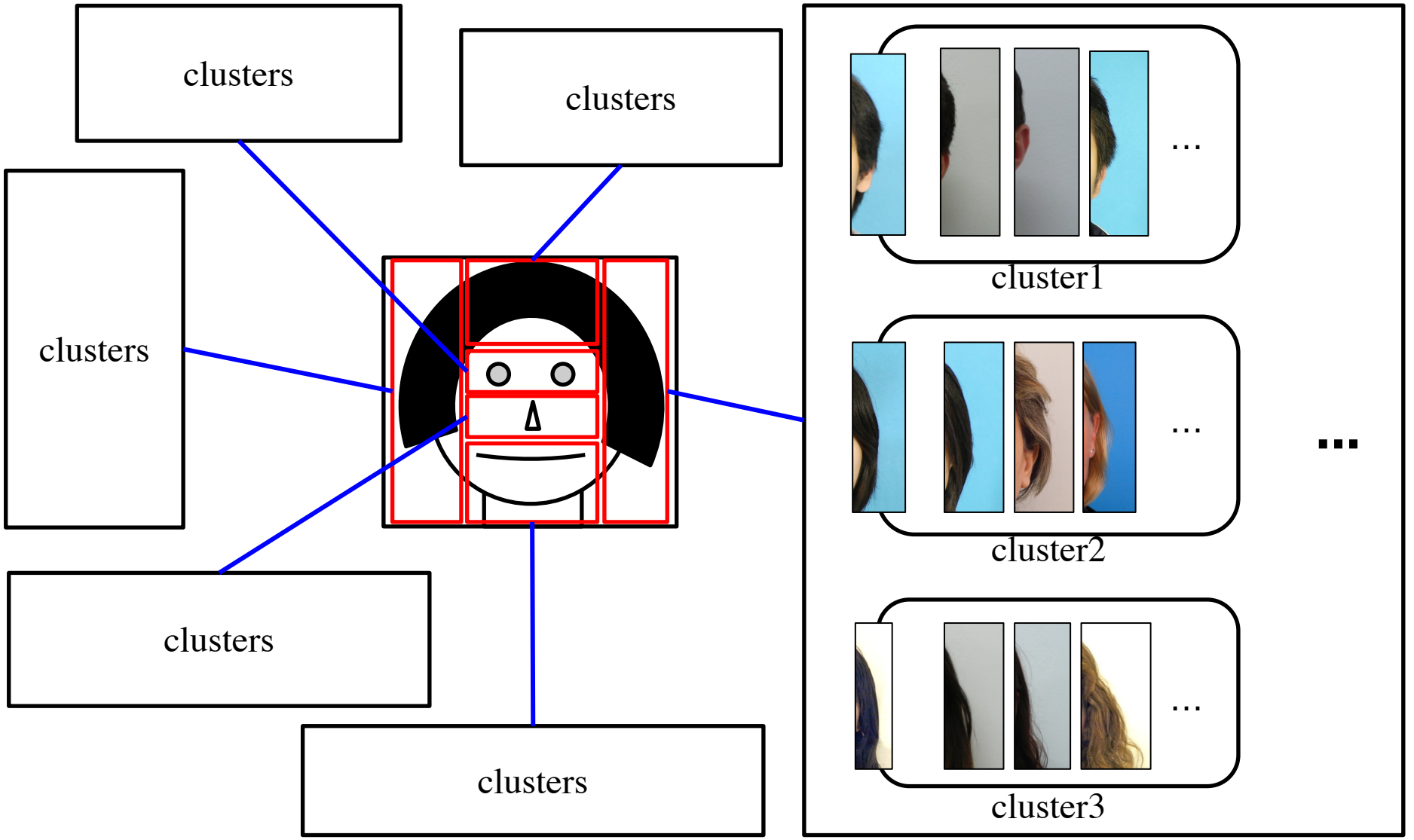
Proposed scheme



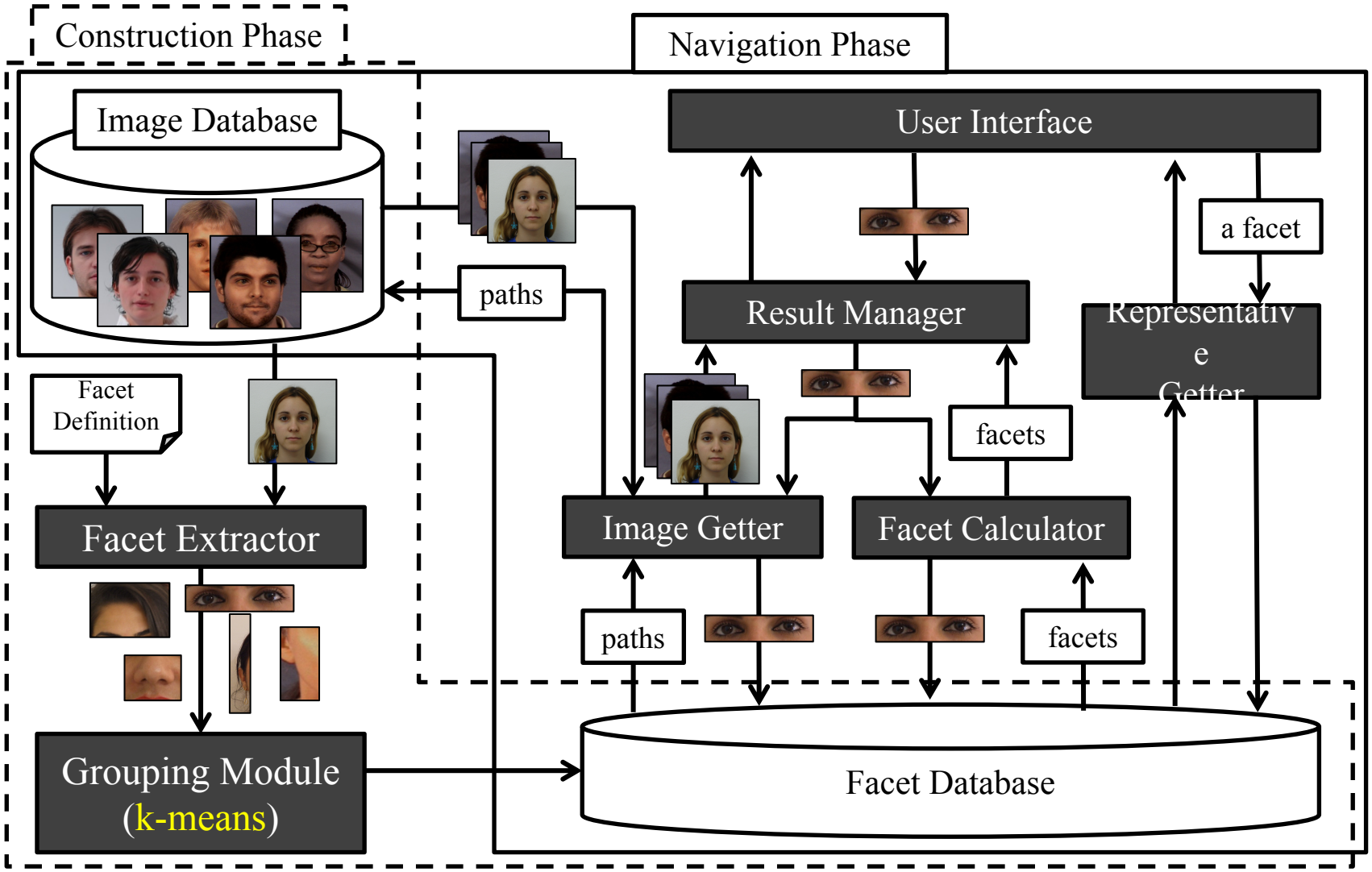
Clustering (e.g. k-means)
- Similarity (e.g. SIFT feature)

Centroids as values of facets

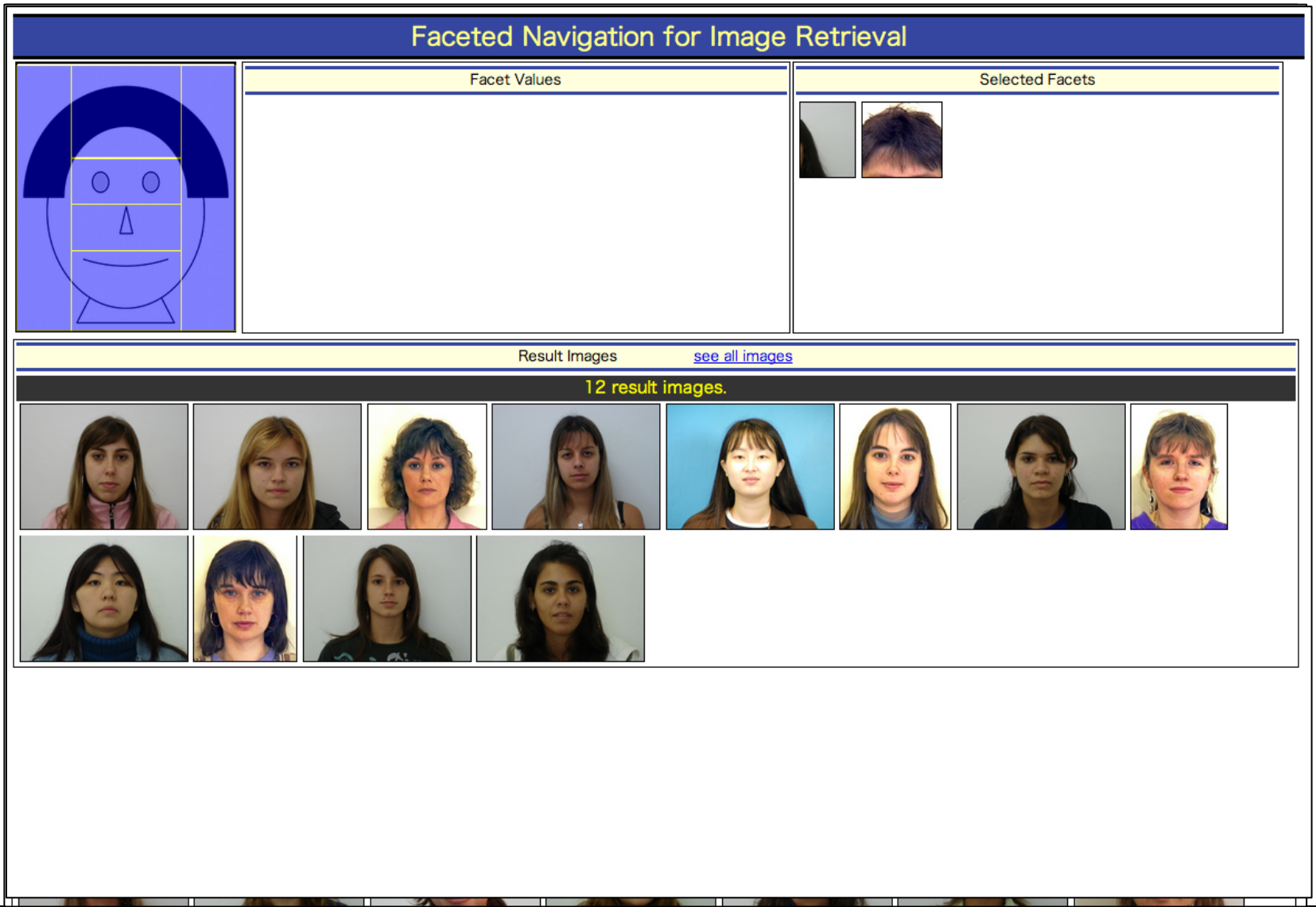
Facet database



FUKUWARAI: the implementation



Interface

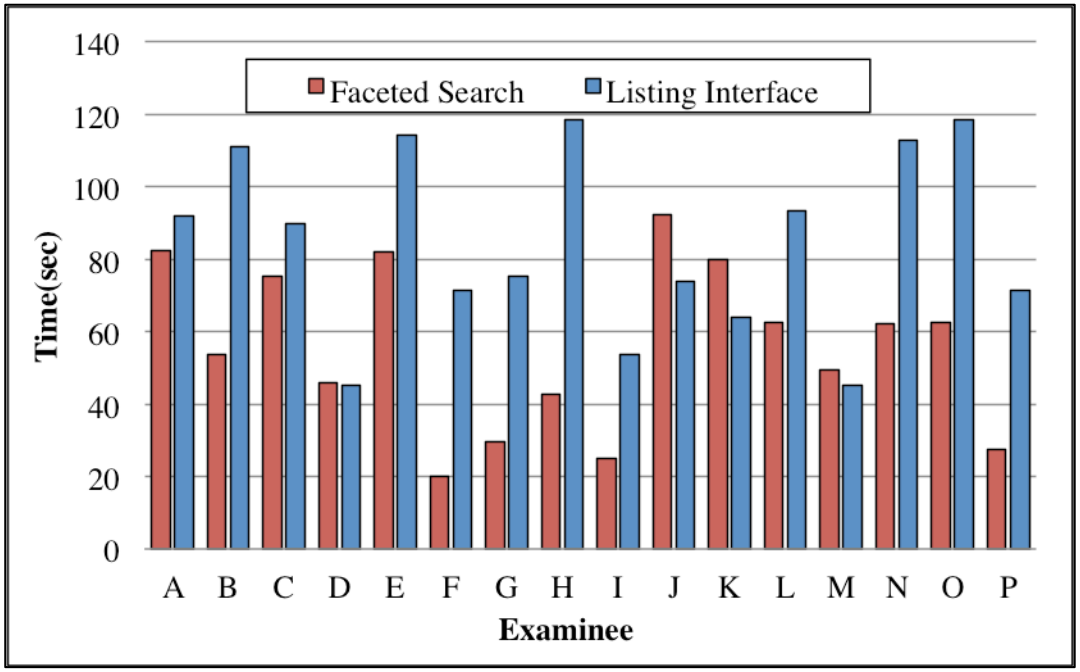

Faceted Navigation for Image Retrieval
Facet Values
Selected Facets
Result Images
see all images
12 result images.

Experimental evaluation

- Dataset: face image dataset (about 600 images)
  - combinatorial dataset of publicly available datasets
- Examinees: 16 people
- Task
  - show 1 image at random and examinee finds the image from the image datasets
  - time until finding the target image
- Listing interface (competitor)
  - show randomly ordered images in the dataset with several pages

Results

Overall result



Results for each examinee

Conclusion

- Faceted search scheme for image search
  - facet: common parts of images
  - values: centroids of clusters of fragmented images
- Experimental evaluation using public image datasets shows our scheme works better than search from the list of images

Future work

- Application for the other datasets
  - products on e-commerce
  - online catalogues
- (Semi-)automatic facet extraction
- Quality of search highly depends on accuracy of similarity computation for clustering
  - improvement of clustering technique
  - other similarity computation

  …

Thank you for your attentions