

# Smart Lifelog Retrieval System with Habit-based Concepts and Moment Visualization

QUIK team

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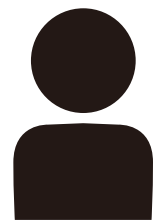
12 June 2019

# Lifelong Semantic Access sub-Task (LSAT)

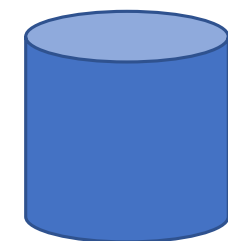
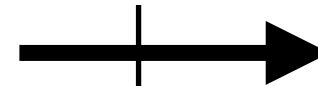
Given a query topic, a system retrieves relevant moments in lifeloggers' daily life

Find the moments when a user was eating icecream beside the sea.

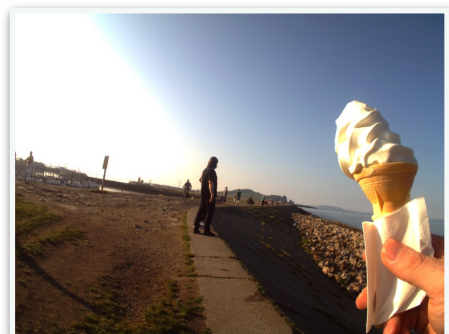
Query



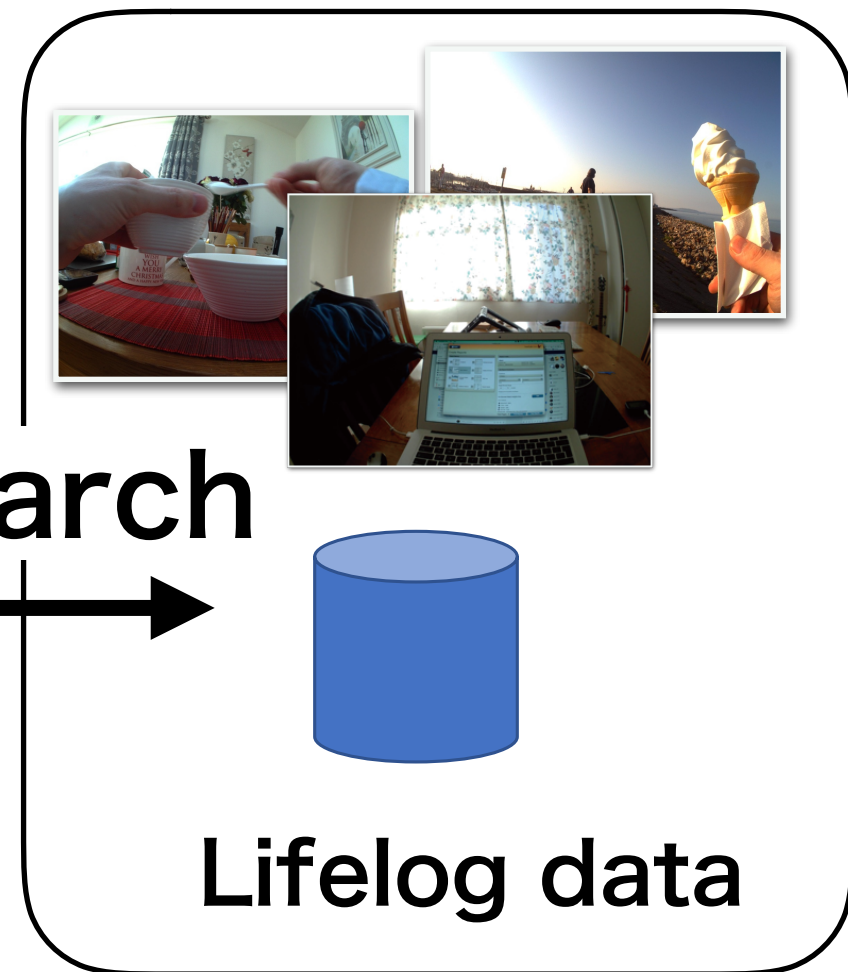
Search



Lifelog data



Return



# Lifelog data

- Lifelog data are in multimodal data
- Three contents types of users' lifelogging data are provided in this task

## Multimedia data

Wearable camera images, Music listing activities

## Biometrics data

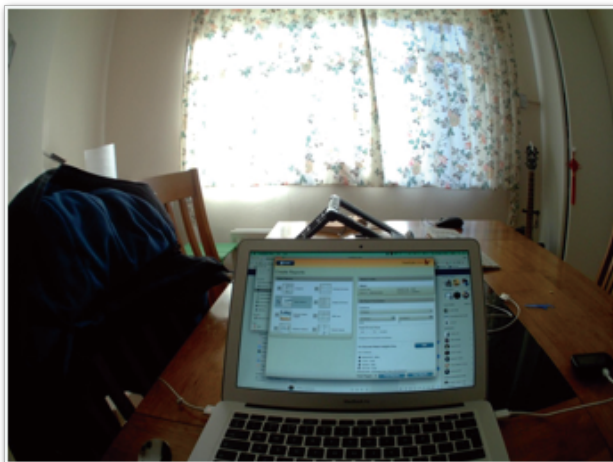
Heart rate, calorie burn, steps and blood glucose

## Human activity data

Semantic location, physical activities

# Visual concepts of lifelog images

- Visual concepts are labeled for each image by auto detectors
- Three types of visual concepts are available



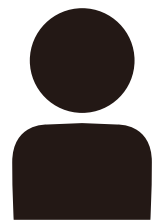
1. Attribute	2. Category	3. Concept
Enclosed area	Home office	Chair
Indoor lighting	Office	Laptop
Studying	Comput. room	Keyboard

- We search moments by querying on the visual concepts (i.e., as documents in traditional search)

# Difficulty of the task

**Activities / events**

**Find the moments I was taking  
a train from the city to home.**



**Query**

Attribute	Category	Concept
Open area	Train st.	Person
Transportin	Subway st.	
Sunny	Railroad	
...		

**Places / objects**

There is a lexical gap between  
events/activities of a query and the visual concepts <sub>5</sub>

# Proposed Method

## 1. Similarity to the moments of query topics



Images  
on the web



[http://groverflanagan.blogspot.com/  
2008\\_09\\_01\\_archive.html](http://groverflanagan.blogspot.com/2008_09_01_archive.html)  
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## 2. Similarity on visual concepts of images with word embeddings



Attribute	Category	Concept
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Open area	Trench	Person
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Natu. light	Desert	Person
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Sunny	Promenade	Person
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...

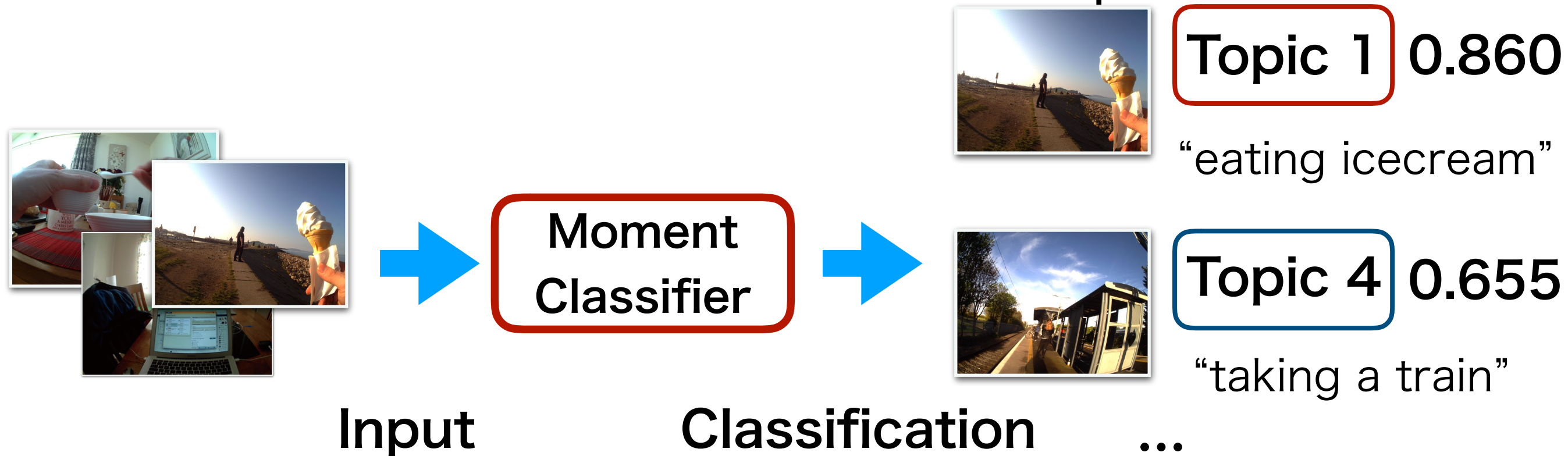
...

...



# Similarity to the moments of query topics

- Compute the similarity to query topics by the moments classification of 24 LSAT topics



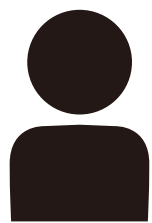
Use classification scores as the moment similarity

# Collecting training data

- Collect images using a web search engine (Google image search)

## Topic

**Find the moments when a user was eating icecream beside the sea.**

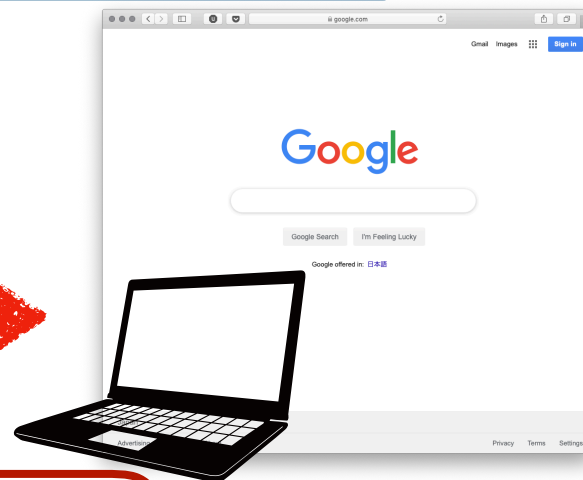


**Q**



**Modified topic**

**I am eating icecream beside the sea**



**Images on the web**



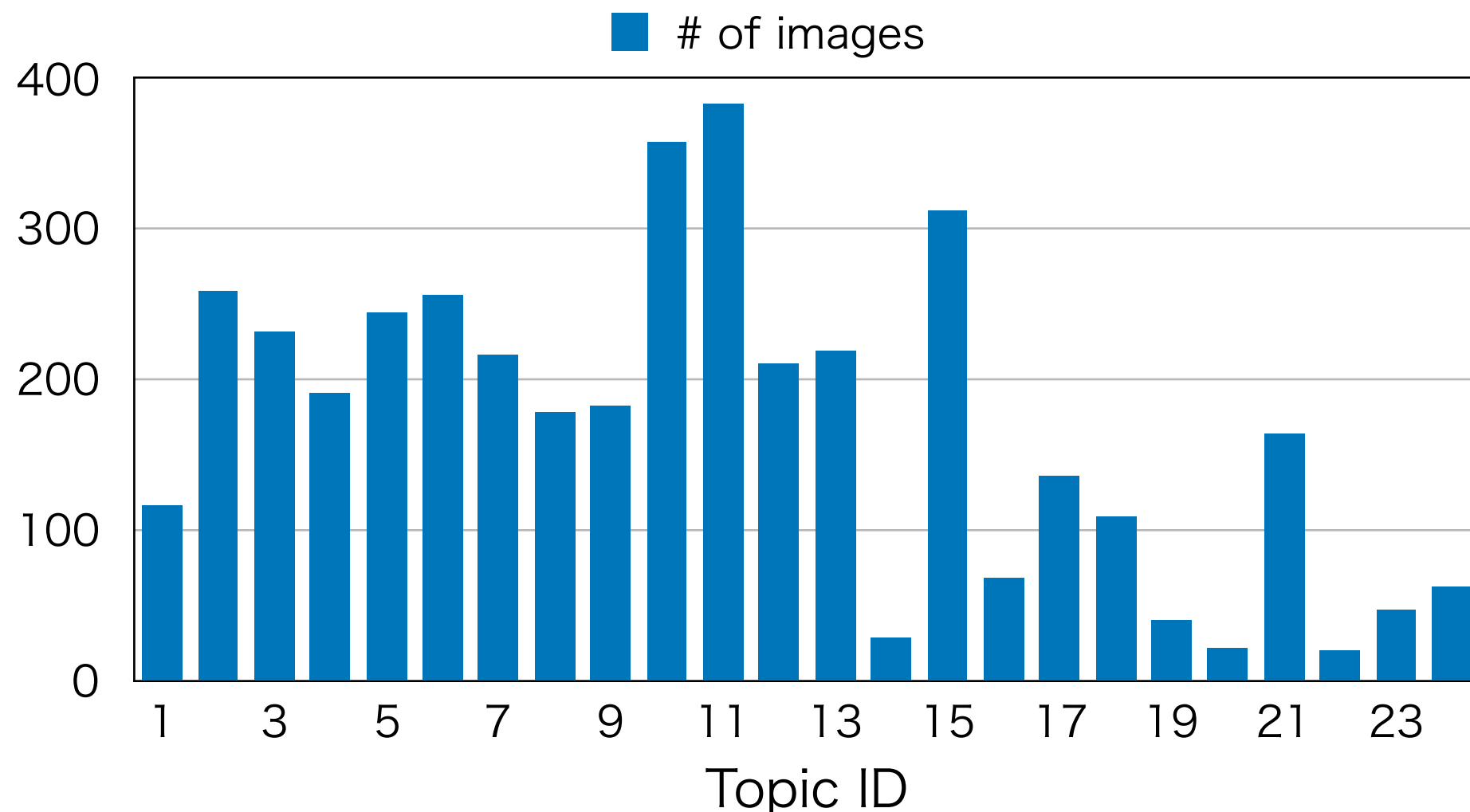
[http://groverflanagan.blogspot.com/2008\\_09\\_01\\_archive.html](http://groverflanagan.blogspot.com/2008_09_01_archive.html)  
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# Collected images

- Manually checked whether a picture is about the moment of the queried topic
- About 170 images were collected on average



# Global similarity

## 1. Similarity to the moments of query topics



Images  
on the web



[http://groverflanagan.blogspot.com/2008\\_09\\_01\\_archive.html](http://groverflanagan.blogspot.com/2008_09_01_archive.html)  
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## 2. Similarity on visual concepts of images with word embeddings



Attribute	Category	Concept
Open area	Trench	Person
Natu. light	Desert	Person
Sunny	Promenade	Person
...	...	...

Q: query, I: Images, V: visual concepts of I

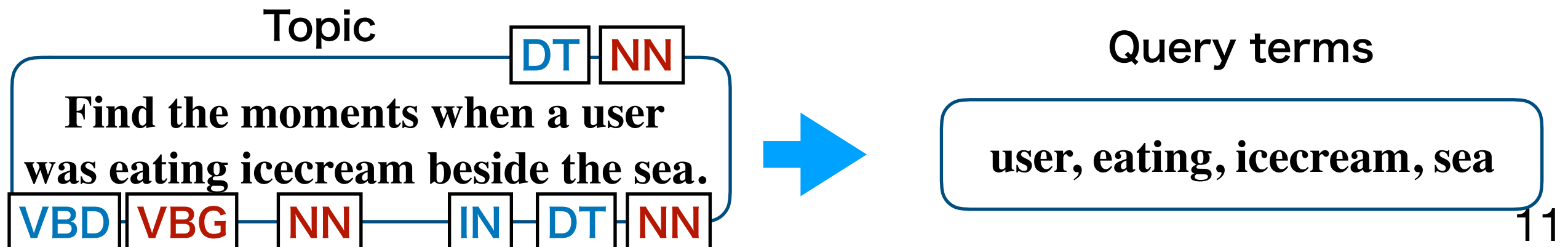
$$sim(Q, I) = \alpha \sum_{q \in Q} sim(q, V) + (1 - \alpha) \times moment(I)$$

# Experiment

- Data: two lifelogger's data and 24 topics

User	Period	# of days	# of images
User 1	3 May ~ 31 May 2018	29	64,132
User 2	9 May ~ 22 May 2018	14	17,615
Total		43	81,747

- Query terms : verb & noun words in the titles
  - POS tagger (Toutanova *et al.*, '03)



# Experimental setting

- We submitted two runs:
- Concept uses only similarity on visual concepts
- Concept + Moment uses the both visual concepts and Moment classification

Run	Attribute	Category	Concept	Moment
Concept	✓	✓	✓	
Concept + Moment	✓	✓	✓	✓

# Official results

Group ID	Run ID	Approach	MAP	P@10	RelRet
NTU	Run1	Interactive	0.063	0.237	293
NTU	Run2	Interactive	0.110	0.375	464
NTU	Run3	Interactive	0.165	0.683	407
DCU	Run1	Interactive	0.072	0.191	556
DCU	Run2	Interactive	0.127	0.229	1094
HCMUS	Run1	Interactive	0.399	0.791	1444
QUIK	Run1	Automatic	0.045	0.195	232
QUIK	Run2	Automatic	0.045	0.187	232

Run1: Concept, Run2: Concept+Moment

# Conclusion

- We proposed an approach based on moment visualization and visual concepts for NTCIR Lifelog-3 task.
- Need to make adjustments on the weighting parameter of similarity computing for improvement retrieval