

On Quantizing the Mental Image of Concepts for Visual Semantic Analyses

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Visual variety

How broad is a term?



Low?



High?

- **Vehicle**

- Object 1.3
- Ground vehicle 3
- Vehicle 2.2
- Motor vehicle 4.5

- **Sports car**

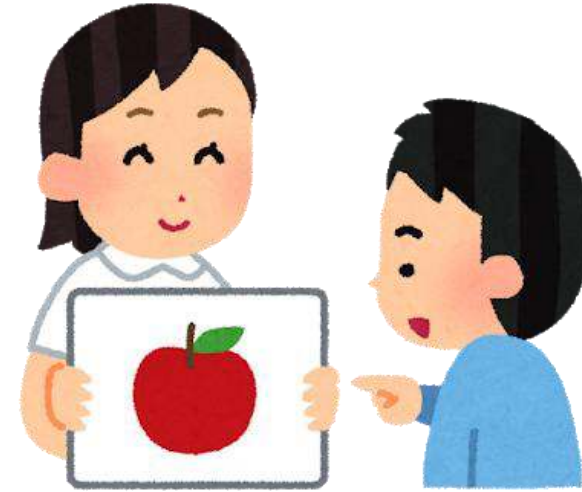
- Car 5
- Same form
- Backgrounds are similar
- Sports car 9.8
- Lamborghini Aventador 6.5



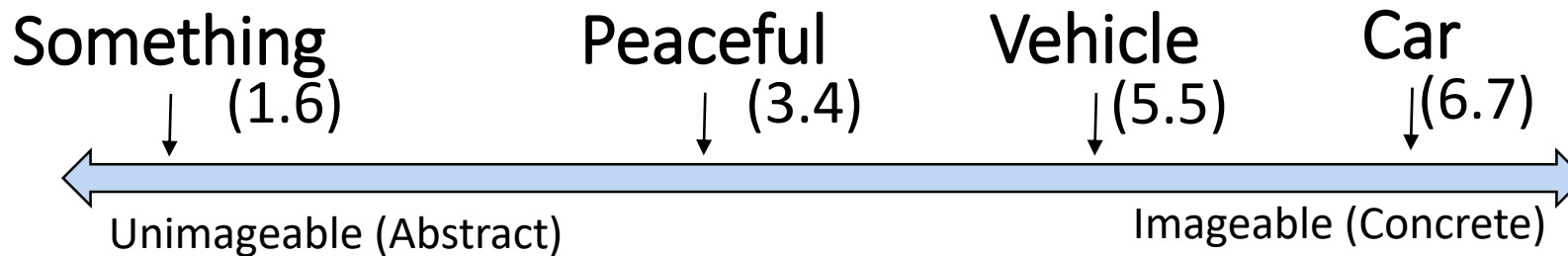
Abstract

Concrete

Imageability of words



- Concept from Psycholinguistics [1]
 - Quantize the perception of words
 - Often described on Likert scales
 - *Unimageable* ↔ *Imageable*, or
Abstract ↔ *Concrete*
- Is a concept imageable? Do you have a mental image when thinking of a concept?



Core ideas

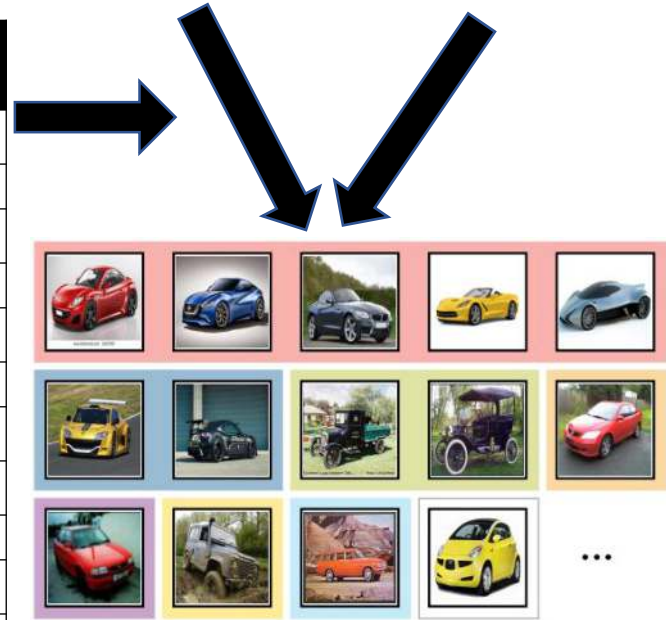
- Estimate the mental image of things for multimedia modelling
- Imagine different concepts
 - Are they hard to visually imagine?
 - Are they rather abstract or concrete?
- Goals
 - Use images from social media and the Web to estimate mental image of things
 - Evaluate the semantic gap between concepts by first quantizing it

Research 1: Dataset-driven

- Create less biased datasets
- Re-composite datasets by using ratio of sub-concept popularities
 - E.g. *vehicle* consists of: many *cars*, few *tanks*



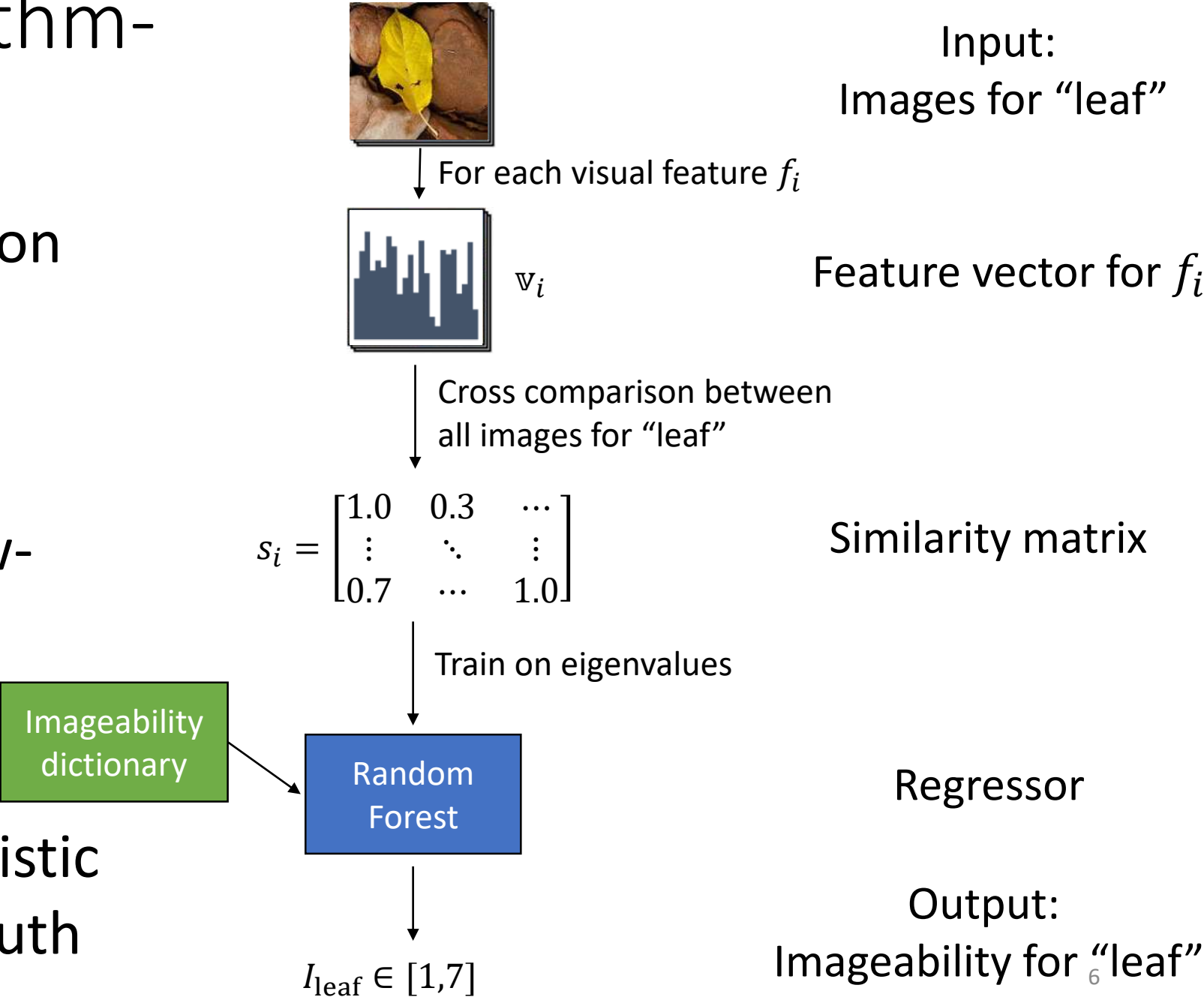
Google Image Search #results	
sports car	27.4%
racer	9.2%
Model T	8.8%
coupe	6.9%
used-car	6.7%
jeep	5.0%
beach w.	4.8%
compact	4.5%
cab	3.9%
convertible	3.5%
hatchback	2.7%
minivan	1.3%
ambulance	1.4%



Re-composited dataset for car

Research 2: Algorithm-driven

- Use visual data mining on crawled images
 - YFCC100M
- Use combination of low- and high-level features
- Train using psycholinguistic dictionary as ground-truth





Thank you for your attention!

Questions?

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