Multi-Attribute Image Retrieval and Ranking by Learning Joint Models

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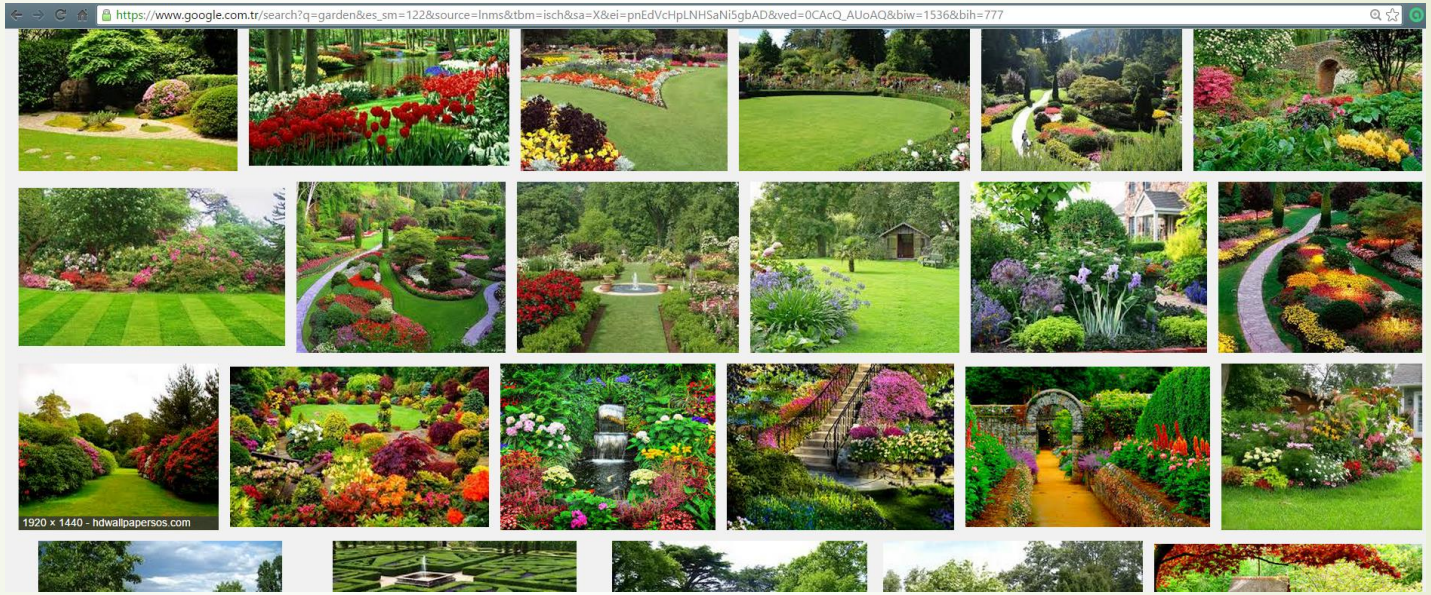
Project Description and Goals

- Description
  - Searching a database of digital images based on user queries
  - Users may search images by entering multi-attribute queries such as «red apple»
  - Learning separate or joint models to obtain better results.

- Goals
  - Develop an image retrieval system that can be used to retrieve a ranked list of images when a query is given.
  - Using Google n-gram to resolve multi-attribute queries.
  - We use PASCAL dataset which has images that well-annotated.

What is Image Retrieval?

- Query: garden
- Based on annotations/tags



- An image retrieval system returns the most relative images to the query.
- We learn models from annotated dataset.
- System returns the images that have high scores after classification.

- For example:
  - If query is «red», system retrieves the images from database that similar to model we learned before for «red».
  - What if query is «red apple» ?

- In traditional methods, system learns models for each word separately .
- Then, gives all results to the user.
  - Learn a model for annotated images as «red»
  - Learn another model for annotated images as «apple»
  - Retrieve images by using those two classifiers

- Results for «red»

- Results for «apple»

- Sometimes, results may be meaningless.
- Maybe we should not think «red apple» separately .
- It depends on query.
- What if user gives a query as «bee and honey»?

- Results for bee:

- Results for honey:

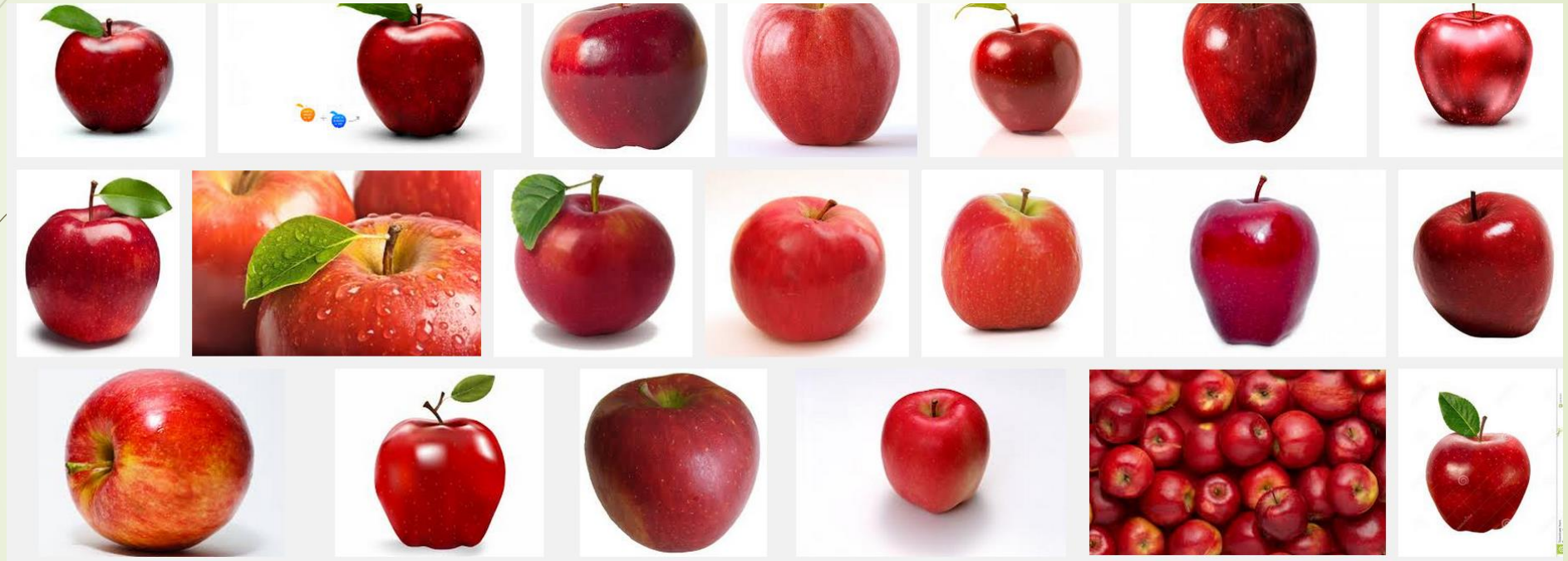
- For that query, learning models separately seems meaningful.

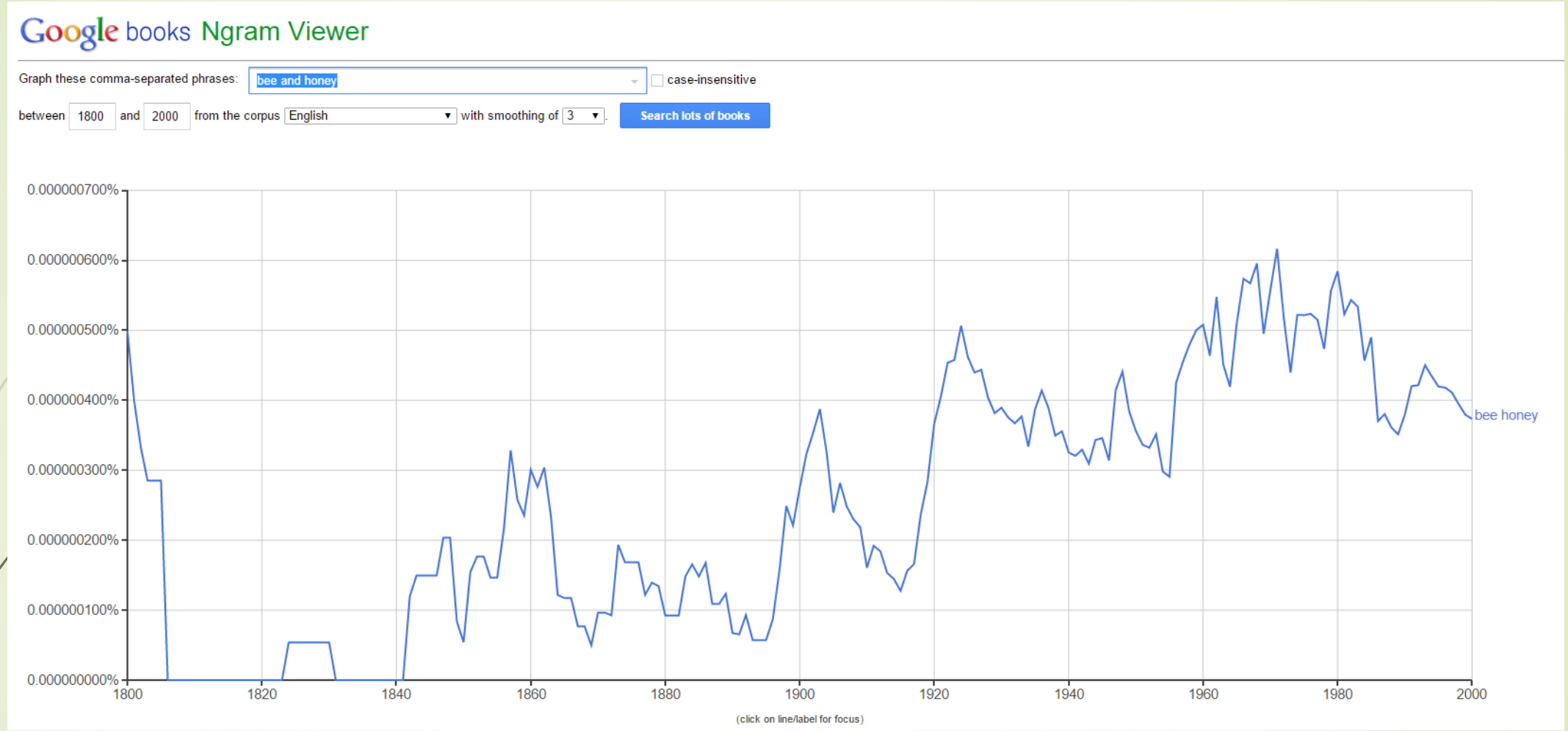
Learning Joint Models by Using Google n-gram

- N-gram charts frequencies of any word or short sentence using yearly count of n-grams found in the sources printed since 1800 up to 2012.
- We learn separate or joint models according to this frequency.
- We determine a threshold.

- Since the n-gram of «red apple» is high,
  - We learn a model by using the images annotated as «red apple»
  - Then, system retrieve images by using this joint model.

Expected Results for «red apple»





- Since the n-gram of «bee and honey» is low,
  - We learn models separately for better results.