

ML Workshop Day 2

Recap of yesterday

- Intro to ML
- Classifiers
- p5.js & ml5js
- Training a model with Teachable Machine
- Building stuff

Any issues?

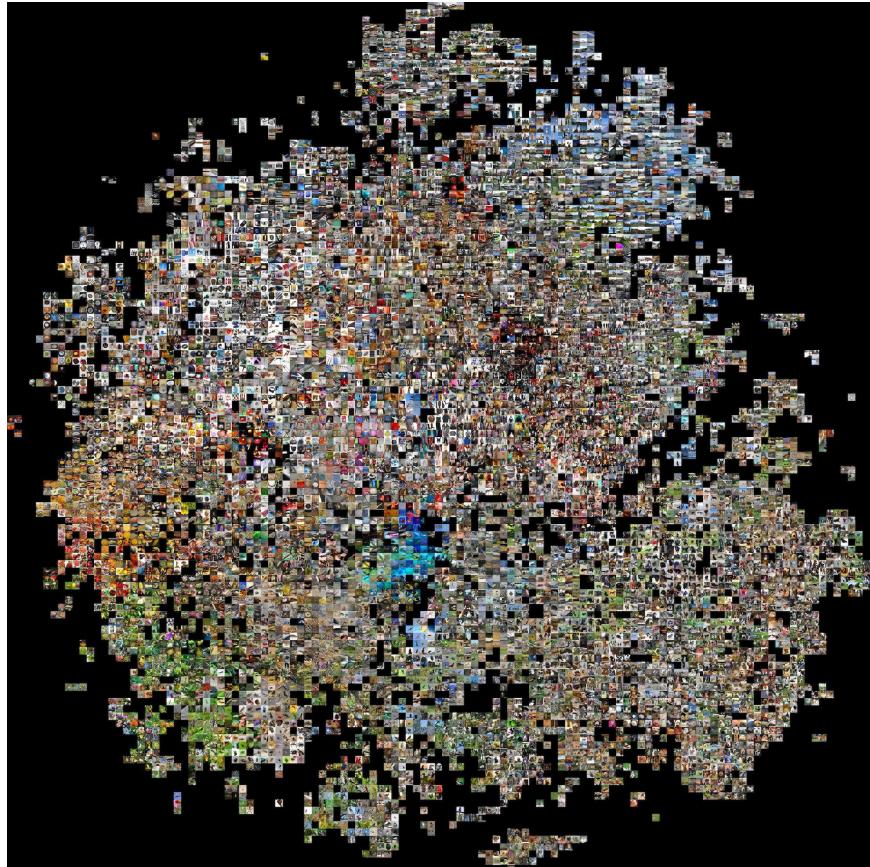
Abusing convolutional networks for fun
and organization

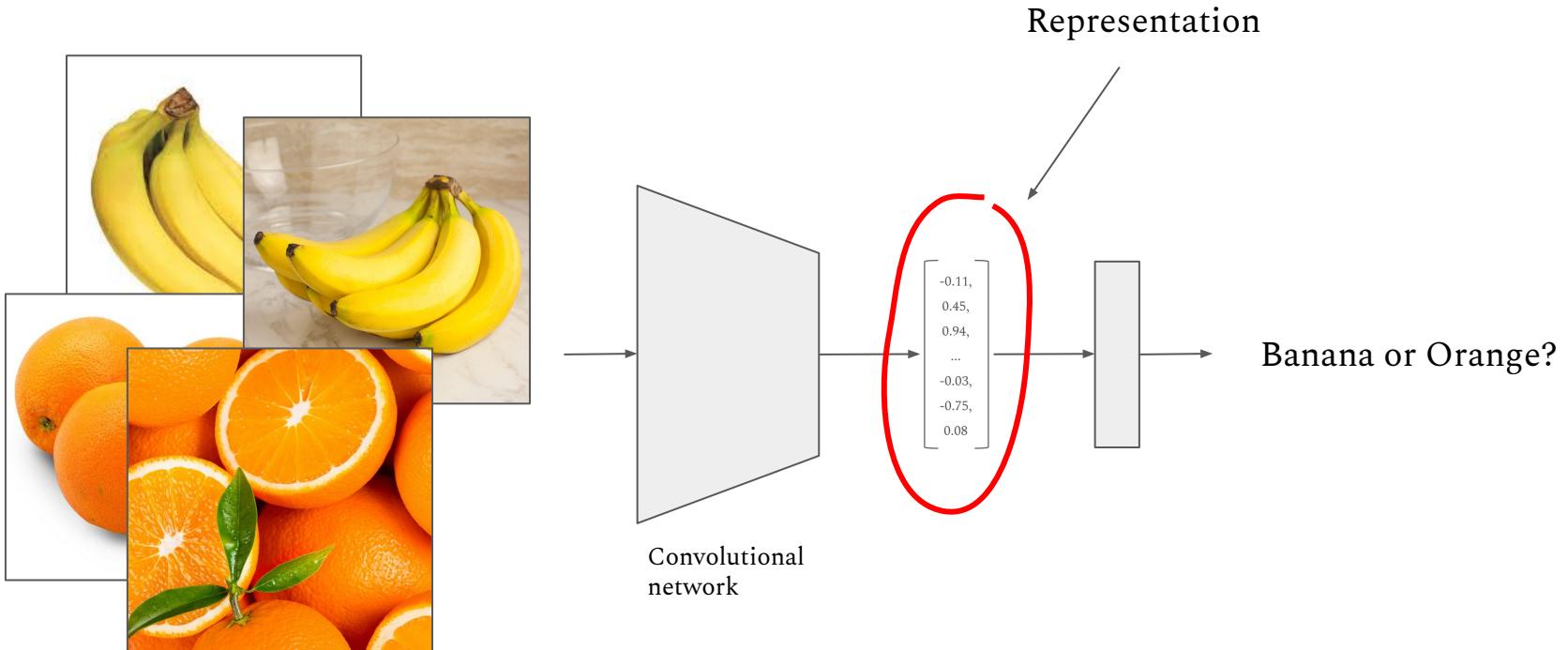


t-SNE embedding of
Nationalgallery paintings,

Convolutional network
trained on genre

<http://vy.nasjonalmuseet.no>



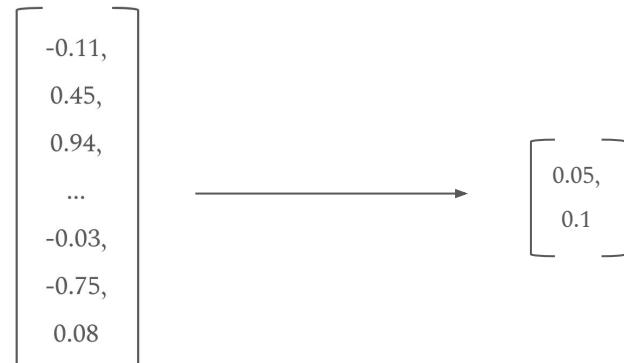




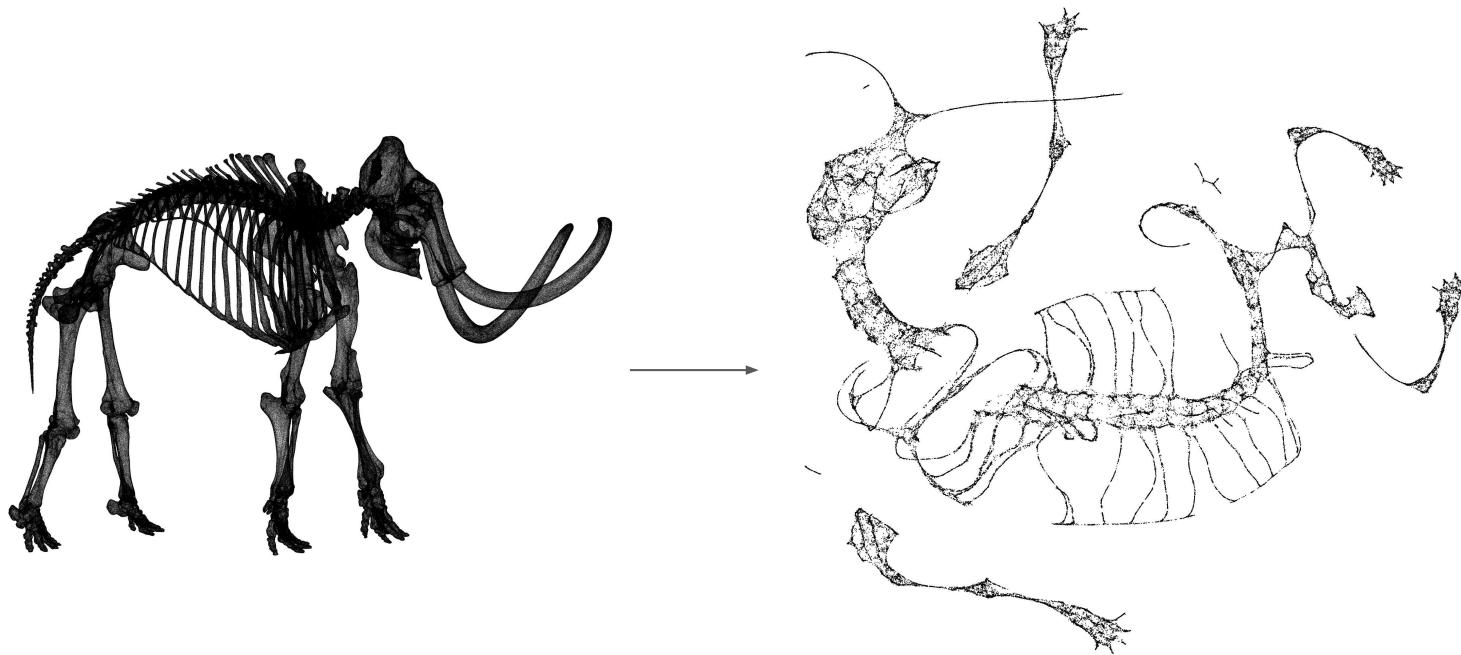


Dimensionality reduction

- Methods for reducing dimensions to 2-D or 3-D while keeping most of the structure between items:
 - t-SNE
 - UMAP



Dimensionality reduction



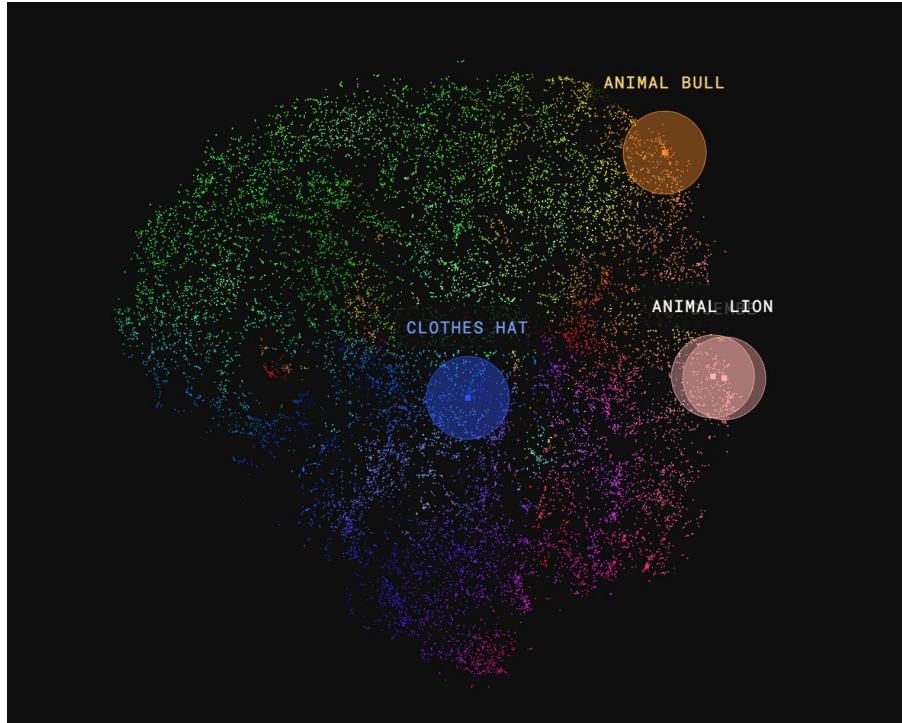
3D to 2D w/UMAP

Source : <https://twitter.com/MaxNoichl/status/1169698085326528512>

Distance / search in representations

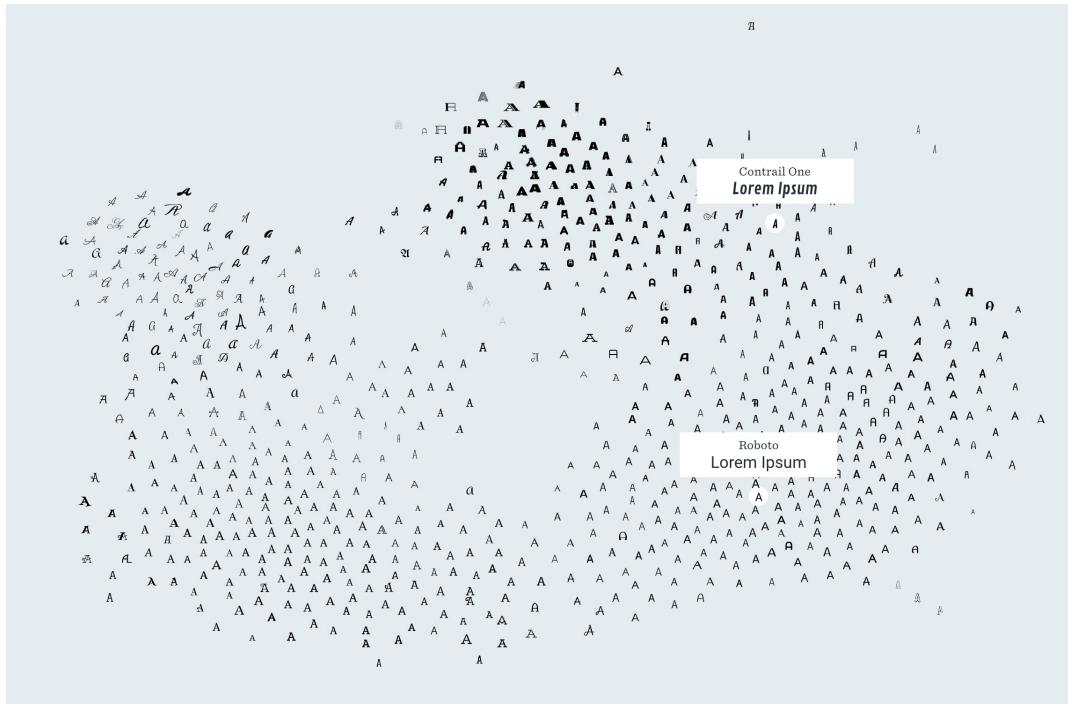
- Similarity search
 - Find similar images
 - Find similar sounds
- Personalization / recommendations
 - Encoding users as representations, similarity search to find recommended items
- Face recognition
 - Find similarity vectors

Similarity in audio



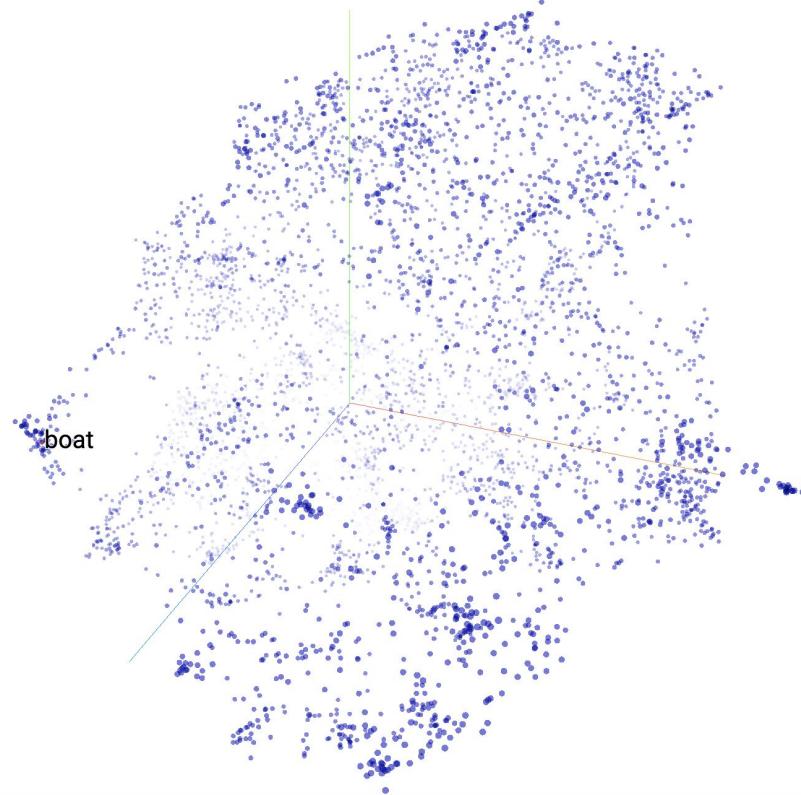
<https://experiments.withgoogle.com/ai/drum-machine/view/>

IDEO Fontmap



<http://fontmap.ideo.com/>

Word representations / encodings



<https://projector.tensorflow.org/>

Image search

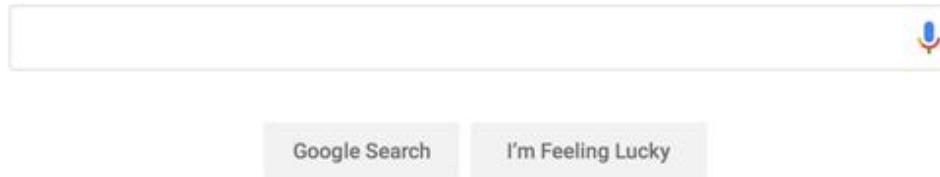


Query image

Top-5 most similar images

Search and Recommendation Applications

Web search is one of most successful ML applications



google

/'goōg(ə)l/

verb

verb: **google**; 3rd person present: **googles**; past tense: **googled**; past participle: **googled**; gerund or present participle: **googling**

search for information about (someone or something) on the Internet using the search engine Google.
"I recently googled my 7th grade teacher and found his current email address"

Billions of users search over trillions of pages

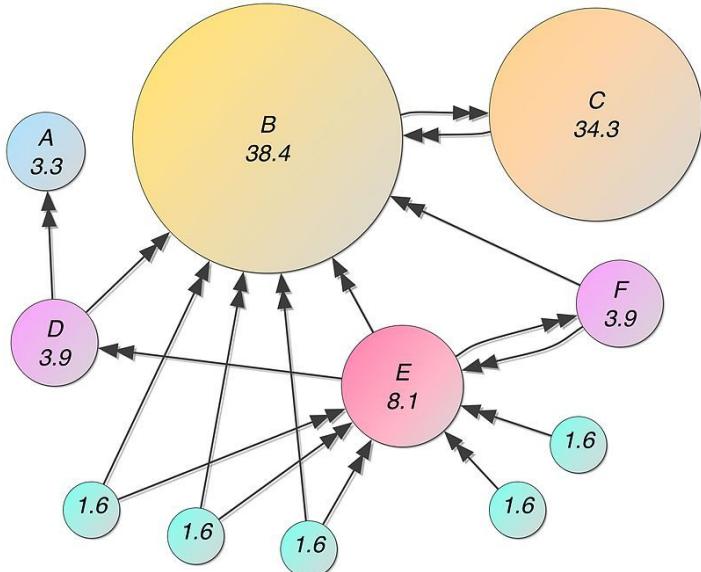
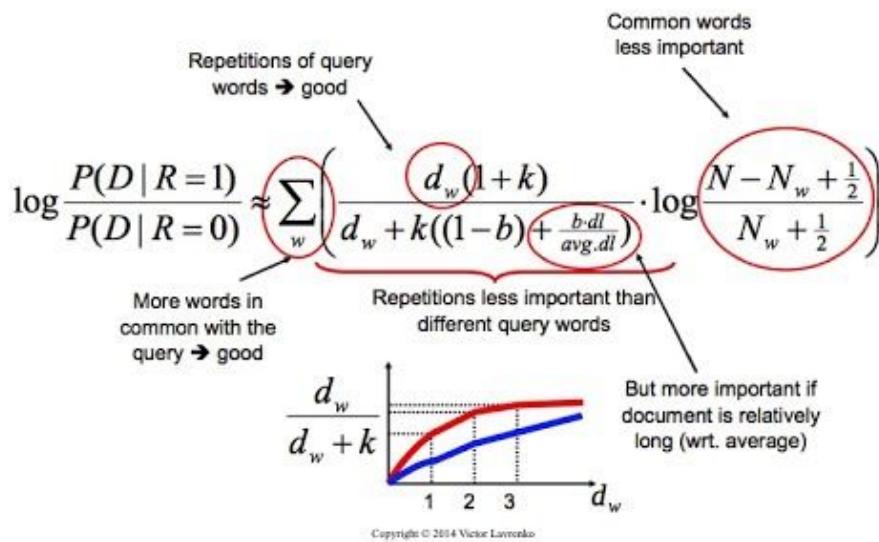
2 trillion
searches per year

130 trillion
pages indexed

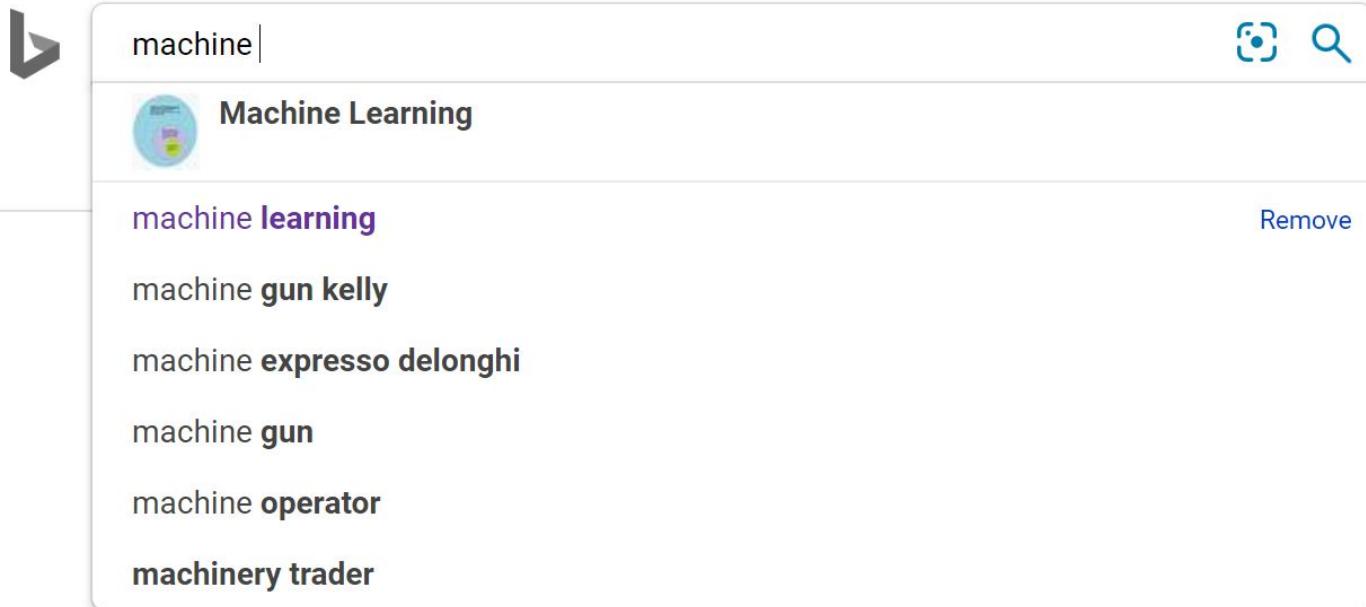
How does ML help search? - Relevance ranking

Term Frequency - Inverse Document Frequency and BM25

PageRank



ML is used to predict what you are searching for



The image shows a screenshot of a search interface, likely from a web browser or a search engine. In the top left corner, there is a logo consisting of a stylized 'b' inside a square. The search bar at the top contains the text "machine". To the right of the search bar are two icons: a magnifying glass and a camera-like symbol. Below the search bar, a list of search suggestions is displayed. The first suggestion, "Machine Learning", is highlighted with a blue circular icon containing a neural network diagram. The other suggestions are listed below it: "machine learning", "machine gun kelly", "machine espresso delonghi", "machine gun", "machine operator", and "machinery trader". On the far right of the list, next to the last suggestion, is a blue "Remove" link.

- Machine Learning
- machine learning
- machine gun kelly
- machine espresso delonghi
- machine gun
- machine operator
- machinery trader

ML is used to correct your typos

The screenshot shows a search interface with the following elements:

- Search Bar:** Contains the text "machine leaning".
- Search Buttons:** Includes a magnifying glass icon and a camera icon.
- Filter Buttons:** Labeled "All", "Images", "Videos", "Maps", "News", "Shopping", and "My saves".
- Search Statistics:** Shows "14,200,000 Results" and a "Any time" dropdown.
- Text Overlay:** A message indicating the search results include "machine learning" and asking if the user wants results only for "machine leaning".

Knowledge graph built by mining the Internet

Machine Learning

 Share



Machine learning is a subfield of computer science that evolved from the study of pattern recognition and computational learning theory in artificial intelligence. In 1959, Arthur Samuel defined machine learning as a "Field of study that gives computers the ability to learn without being explicitly programmed".

Machine learning - Wikipedia

https://en.wikipedia.org/wiki/Machine_learning

Subdisciplines of: Artificial Intelligence · Computer Science

Subdisciplines: Deep Learning · Supervised Learning

Academic conferences: AAAI 2016 · NIPS 2015 · ICML 2016 · IJCAI 2016 · KDD 2016 · CVPR 2016 · ICASSP 2016 · ICDM 2015 · ACL 2016 · AI 2016 · CHI 2016 +

Related people

[See all \(20+\)](#)



Arthur
Samuel



Tom M.
Mitchell



Andrew Ng



Geoffrey
Hinton



Michael I.
Jordan



Fei-Fei Li



Leo Breiman

Natural language understanding

PEOPLE ALSO ASK

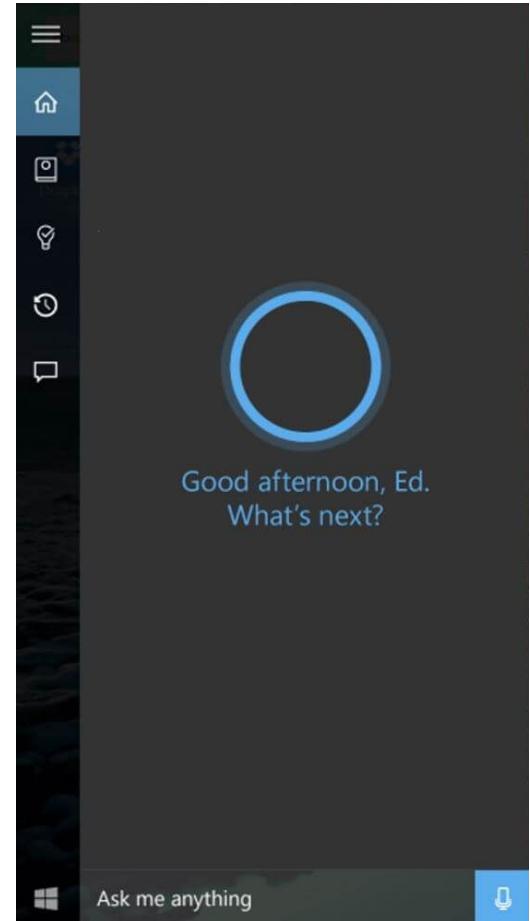
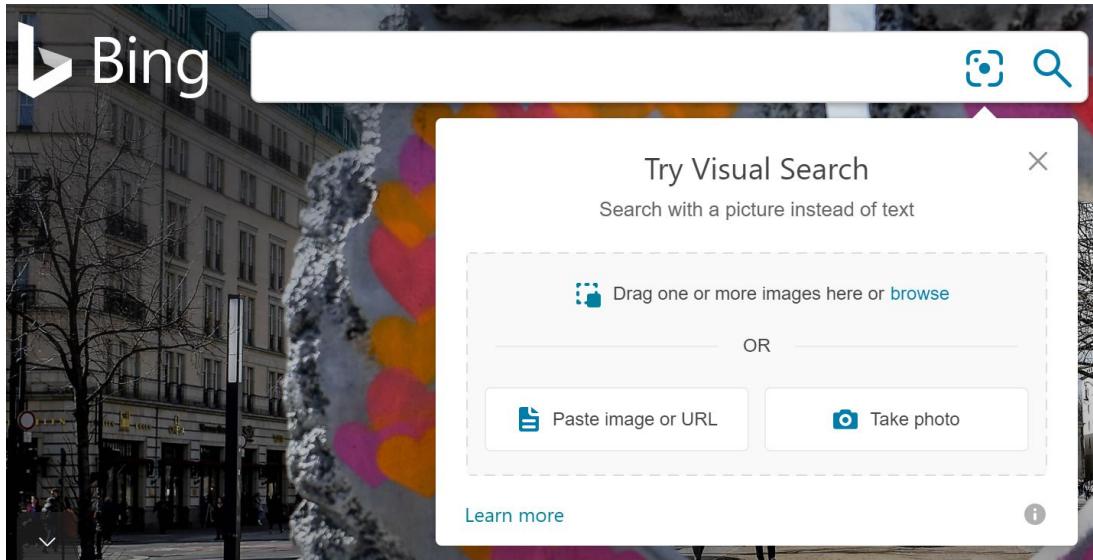
What is the difference between AI and machine learning? 

What is machine learning and its importance? 

What are the prerequisites for learning machine learning? 

Is machine learning a scam? 

Image and voice input



Recommendation can be viewed as search without query



Search

Home

Following

N



8



Similar item recommendation is also widely used

The image shows a Pinterest search results page for the term "Japanese paper". The main search result is a large image of a Japanese paper bowl featuring intricate floral and landscape patterns. Below the main image is a "More like this" grid containing numerous smaller images of various Japanese decorative items, including vases, boxes, and teapots, all featuring traditional patterns. To the right of the grid, there is a sidebar with a "More ideas you might love" section, which includes categories like "Decorative boxes", "Vintage suitcases", "Antique jewelry box", "Vintage luggage", "Trinket boxes", and "Jewelry casket".

Search results for Japanese paper

Uploaded by Gaynor Laitt

Comments

Gaynor Laitt saved to Japanese art works

More like this

More ideas you might love

- Decorative boxes
- Vintage suitcases
- Antique jewelry box
- Vintage luggage
- Trinket boxes
- Jewelry casket

Boards like yours

Vintage cups

Japanese pottery

Tea set

Chinese porcelain

Porcelain painting

Tableware

Tea pots

Recommendation is often personalized

Etsy

Notifications 8 | Shop Manager | You | Cart

Jewelry & Accessories Clothing & Shoes Home & Living Wedding & Party Toys & Entertainment Art & Collectibles Craft Supplies Vintage Gifts

Welcome back, Stella!

Suggested searches Based on your recent activity

japan fabric furoshiki black gold decor small vintage box

Our picks for you [See more](#)

 71.43 NOK FREE shipping	 71.43 NOK FREE shipping	 71.43 NOK FREE shipping	 76.19 NOK FREE shipping	 76.19 NOK FREE shipping	 63.81 NOK FREE shipping
---	---	---	--	---	---

Search vs Recommendation

Search

- Goal: perfect relevance
- Often with clear user intent
- Looking for explicit match
- Occasionally personalized
- Typical examples:
 - Web search
 - Text search

Recommendation

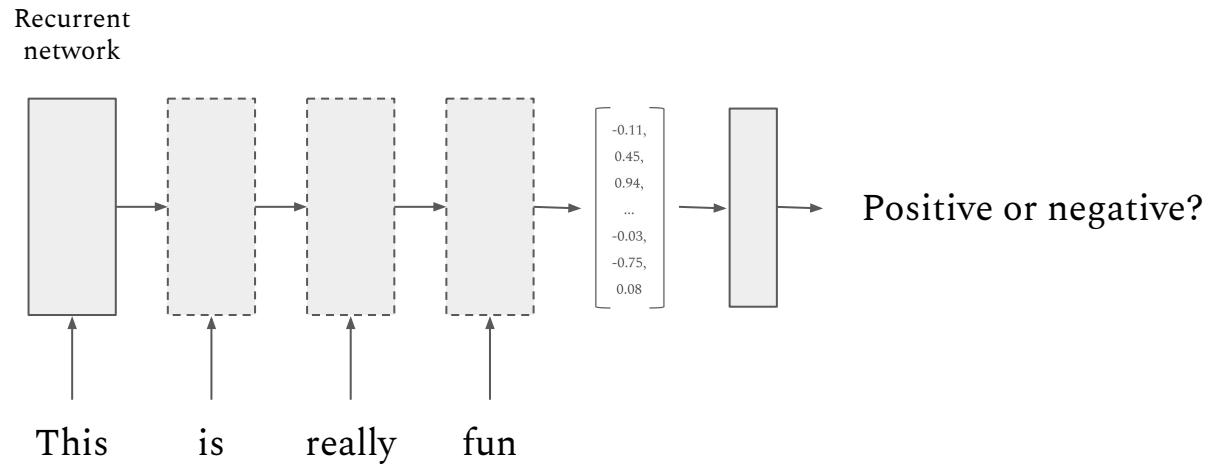
- Goal: serendipity experience, discovery
- Sometimes without clear user intent
- Including also implicit similarity
- Mostly personalized
- Typical examples:
 - News feed
 - E-commerce suggestions

Lunch

Build some stuff!

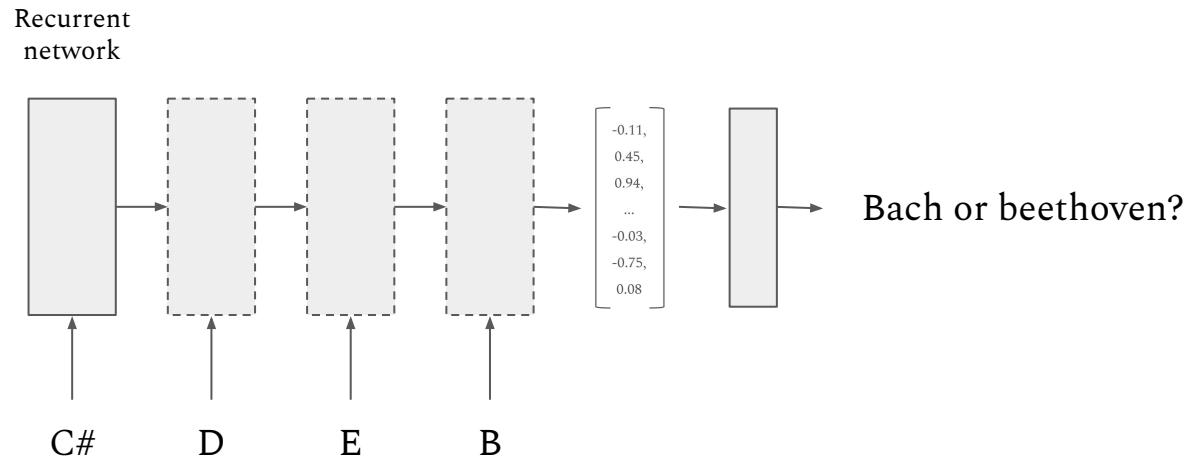
Generative Machine learning

Sequential models



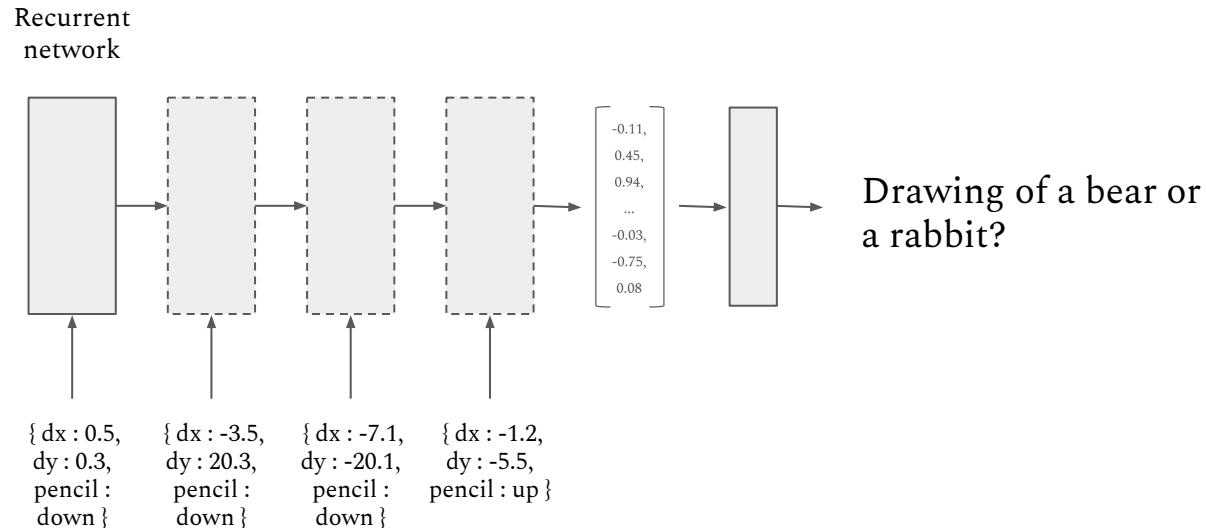
Sentiment recognition

Sequential models



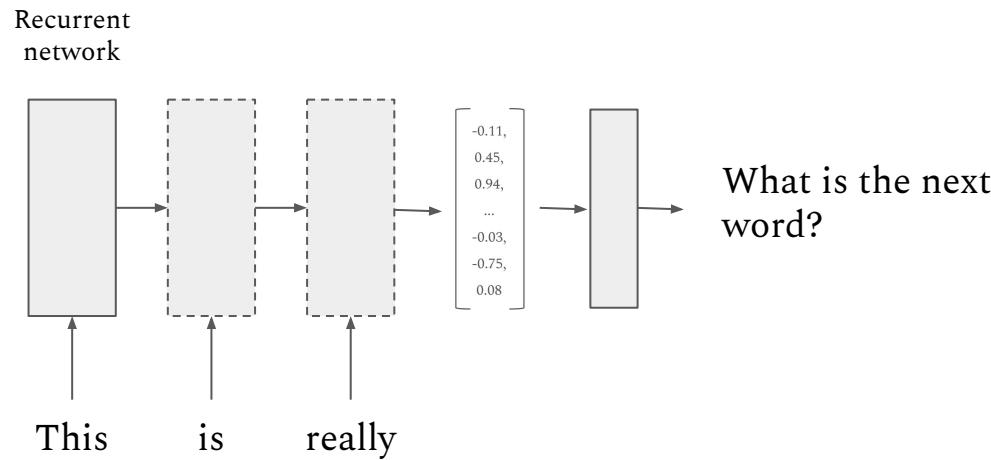
Music recognition

Sequential models



Sketch recognition

Generative sequential models



End