

I Trust AI

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ITrustAI



In this Part...

- 1 Central Question
- 2 Deep Learning
- 3 NLP
- 4 Computer Vision
- 5 Speech
- 6 Educational Platform

Our Central Objective



- Develop **AI systems** for records and archives *competently* and *efficiently* while maintaining the *nature* and *trustworthiness* of the records

- Break down archival functions into **AI tasks**
- Good tasks are ones **clearly defined**
- Proceed from **simple to complex**

- Develop **AI methods** to tackle tasks
- **Focus:** SOTA, explainable, interpretable

- Identify, acquire, and develop **data**
- **Several questions, e.g., ethics, privacy, ownership, respect, community norms**

- What are **measures of success?**

- A major **training component**
- **Talks, tools, workshops, courses, tutorials, etc.**

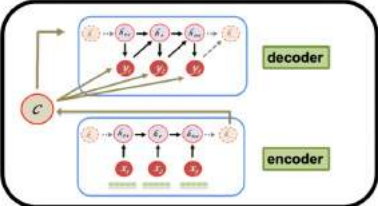
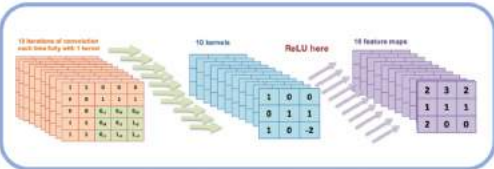
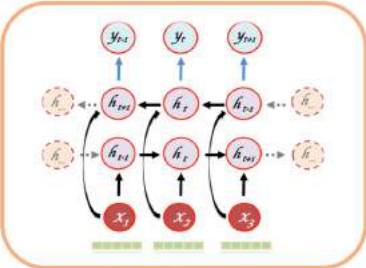
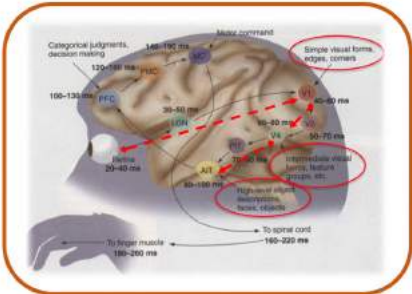
Artificial Intelligence

Machine Learning

Deep Learning



Deep Learning

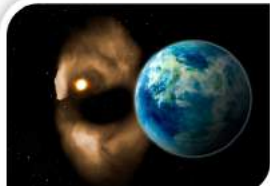


DL for Scientific Discovery

Biology



Astronomy



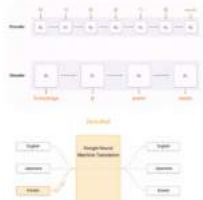
Agriculture



Chemistry



Machine Translation

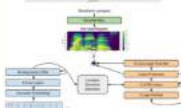


<https://research.googleblog.com/>



<https://translator.microsoft.com/help/articles/neural/>

Speech



<https://research.googleblog.com/>

Image Captioning



[Microsoft Research; He et al., 2015]



<https://research.googleblog.com/>

Named Entity Recognition (NER)

Albert Einstein **PER** Albert Einstein was born in **Ulm LOC** in **Germany LOC** on March 14, 1879. Six weeks later the family moved to **Munich LOC**, where he later on began his schooling at the **Luitpold Gymnasium ORG**. In 1896 he entered the **Swiss Federal Polytechnic School ORG** in **Zurich LOC** to be trained as a teacher in physics and mathematics.

Name Surname Occupation Location

die dia rebere de **Llorens** **Masanes** peller habitant en **Barç.** fill
de **Lore** **Masanes** parayre de **Josfona** y de **Eularia** defuncte
ab **Sperança** donjella filla de **francesc** **fernex** pages de **Cornella**
defuncte y de **Sperança**

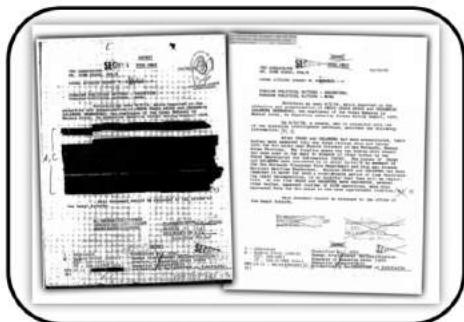
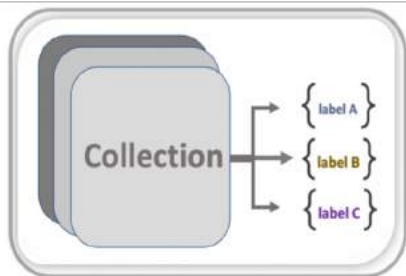
(Esposalles database, a marriage license book conserved at the Archives of the Cathedral of Barcelona)
Source: <https://rc.cvc.uab.es>.



Topic modeling provides methods for automatically organizing, understanding, searching, and summarizing large electronic archives.

- 1 Discover the hidden themes that pervade the collection.
- 2 Annotate the documents according to those themes.
- 3 Use annotations to organize, summarize, and search the texts.

Text Classification



- (1) Just got chased through my house with a bowl of tuna fish. 🙄 ing. [Disgust]
- (2) I love waiting 2 hours to see 2 min. Of a loved family members part in a dance show 🙄 #sarcasm [Sarcastic]
- (3) USER Awww 🙄🙄 CUPCAKES SUCK IT UP. SHE LOST 🙄🙄 GET OVER IT 🙄🙄 [Offensive]

Descriptions of Visual Archives



(Google image search)

Machine Translation



English (Google): And they grow apart. She is the princess of the white forest.
 English (Protektor): And we spent some time but We didn't have it. I prefer for.
 English (Linguee): I realized it is hard work. It was the good. I have learned experience.
 English (Protektor): Make us learn to learn. (Linguee) has a lot of. We had a lot of. Make some experience project for.
 English (Linguee): I found the story & how they made it in low cost, get it and feel it naturally don't know why I didn't see it right in all the right experience from there. I cannot believe it was 2004 it was released though, 14 years ago!
 English (Protektor): maybe they had passed away and was girls but and what time before, make honestly make some time to make the highly more solid but make the knowledge and experience makes more. make make make from it. I don't want to know how it, it was good!

Arabic	0.951
Chinese (Simplified)	0.926
Chinese (Traditional)	0.926
Czech	0.916
Dutch	0.916
French	0.916
German	0.916
Japanese	0.916
Korean	0.916
Russian	0.916
Spanish	0.916
Swedish	0.916
Turkish	0.916
Ukrainian	0.916
Vietnamese	0.916
Yiddish	0.916

(I) MSAEA أنا عايز شغل جامد يا جدامان

Human I want hard work, guys.

Google I want a rigid job, Jadaan.

Image Captioning



A woman is throwing a frisbee in a park.



A dog is standing on a hardwood floor.



A stop sign is on a road with a mountain in the background.



A little girl sitting on a bed with a teddy bear.



A group of people sitting on a boat in the water.



A giraffe standing in a forest with trees in the background.

(Xu et al., 2016)

Museum Image Captioning



Captions: (1) Lion-Shaped Furniture Leg. (2) In both Egypt and Nubia the lion was associated with the sun god and symbolized royalty.

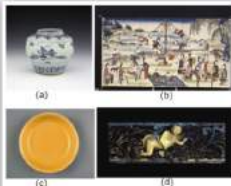


Figure 3: Four ancient Chinese artwork images.

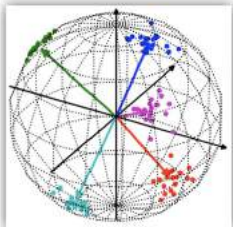
Images	(a)	(b)	(c)	(d)
Artifact type	Jar	Print	Dish	Tile-Six
Model NC	Porcelain jar with underglaze blue decoration	Woodcut	There is a man in underglaze blue on the base	There is an inscription on the base
Model SA	Porcelain jar with underglaze blue decoration	Woodcut	Porcelain dish with rounded sides	Made of blue glazed porcelain
Model LSTM-A, NC	The avoid jar has a short neck with a flared rim and a recessed base	Woodcut	Porcelain dish with rounded sides	Made of blue glazed porcelain
Model LSTM-MC-OUT _{ensemble}	Porcelain jar with underglaze blue decoration	ink and colour on paper	Porcelain dish with rounded sides	Earthenware soil tile with rounded decoration and green glaze

Figure 4: Generated captions for the images in Figure 3 by model NC, SA, LSTM-A, NC and LSTM-MC-OUT_{ensemble}.

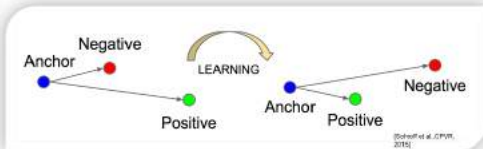
(a)	Porcelain jar with underglaze blue decoration. This jar has a narrow raised neck, rounded body and tapering foot. On the unglazed base the spiral marks resulting from turning the jar on the potter's wheel are clearly visible. On the outside an old man is shown in a landscape on one side and another, walking with a servant carrying a jar, snuggled in a female cloth, on the other side. They are separated by clouds and rocks. Around the neck is a double ring with banana leaves forming a collar, stylized lotus, like vertical legs and short stipes, surround the foot. The cobalt blue appears black where it has not been covered by the blue-green glaze. Originally the jar would have had a domed cover with lotus-bud finial.
(b)	Woodcut. Recreation. Acrobats and jugglers and women playing musical instruments. Printed in ink, colour on paper.
(c)	Porcelain dish has yellow enamel over the plain tempatic glaze. There is an inscription on the base, which is glazed.
(d)	Tile tile with relief rounded decoration and faience-cotta glazes. This faience-cotta tile is moulded and carved in relief with a central boy flying in a colorful pose through swirling foliage. He is naked except for a loincloth with three pierced beads. He holds the stem of lotus foliage in his right hand and waves the other hand. The tiny cut in the centre of his forehead indicates his youth. The turquoise glaze is fugitive.

Figure 5: Ground-truth captions for the images in Figure 3.

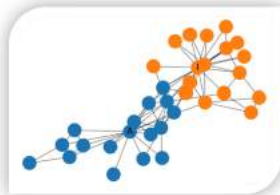
(Sheng & Moens, 2019)



Contrastive Learning



Graph Representation Learning



(<https://github.com/UBC-NLP/itrustai-tutorials>)

AI and ML Tutorial Repository

This repository houses tutorials created for the iTrustAI SSHRC Partnership Grant. These tutorials will grow over time and will be used in hands-on workshops for training purposes.

Natural Language Processing

Natural Language Processing (NLP) is the field focusing on developing methods and tools for understanding and generating human language. As such NLP actually covers a wide range of technologies, with many different applications, that are often used in concert with one other. For instance, a type of text classification such as sentiment analysis might try to utilize part of speech (POS) tagging to disambiguate word meaning through the POS tag, and therefore improve performance on the text classification task. In this section we will introduce code to train models for many of the core NLP tasks.

Part of Speech (POS) Tagging

	Category	Descriptions	Link
1	POS Tagging	POS with spaCy	notebook
2	POS Tagging	Train BiLSTM with PyTorch from Scratch	notebook
3	POS Tagging	Finetune with BERT from Scratch	notebook

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