Artificial Intelligence

How human language is being interpreted by machines?

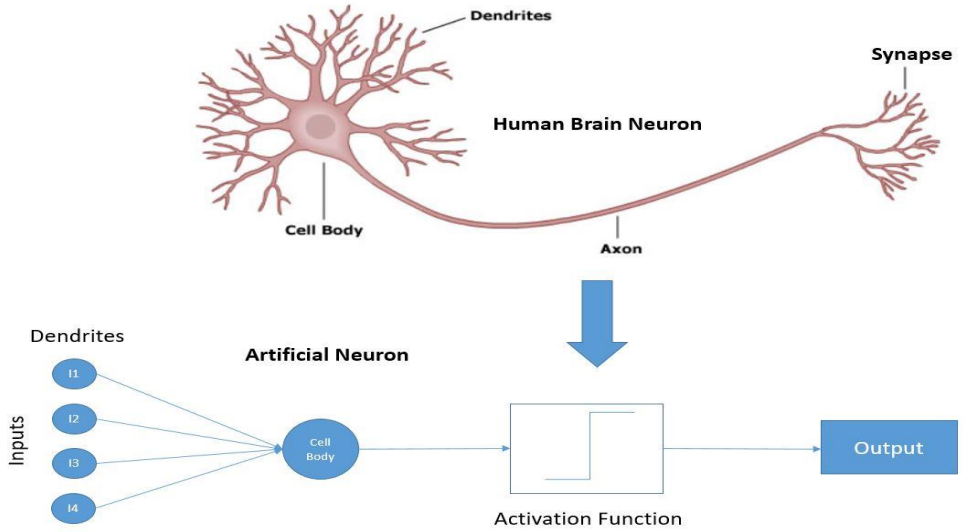
Deeper into the field of AI – Machine Learning & Deep Learning

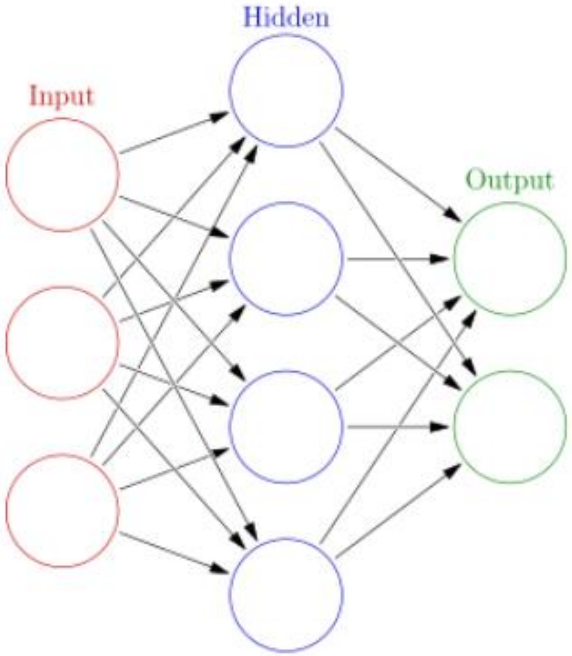
What is Machine Learning?

- ML forms a subset of AI
- ML is used to perform a task without being explicitly programmed.
- ML can be broadly categorized – supervised, unsupervised, and reinforcement learning.
    - Supervised : training with labelled data (Trend Analysis)
    - Unsupervised: training with unlabeled data (Market Segmentation)
    - RL: Reward Based Training (HomeBot Cleaner)
- ML involves a lot of feature engineering regarding feature extraction – Image recognition, sentiment analysis, etc…

What is Deep Learning?

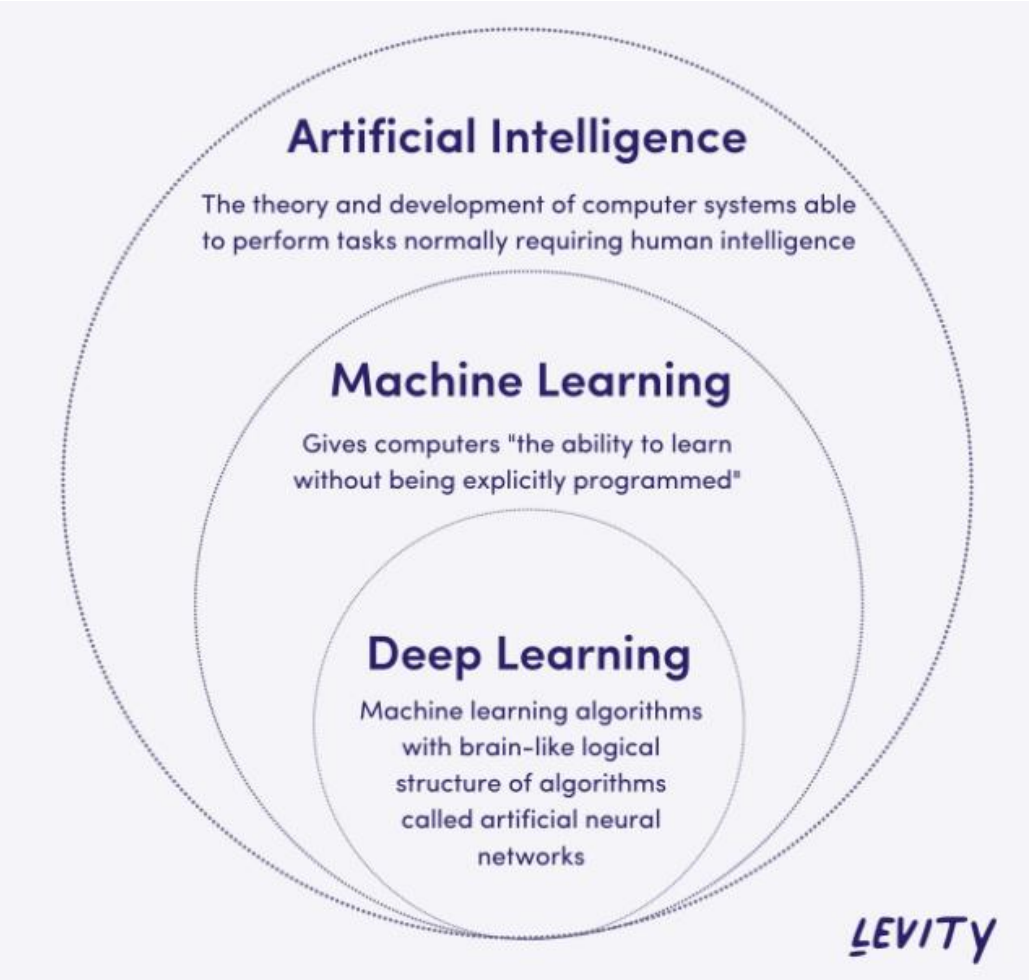
- DL forms a subset of ML which models data as complex networks
- Basic idea of deep learning revolves around neurons and their interaction.

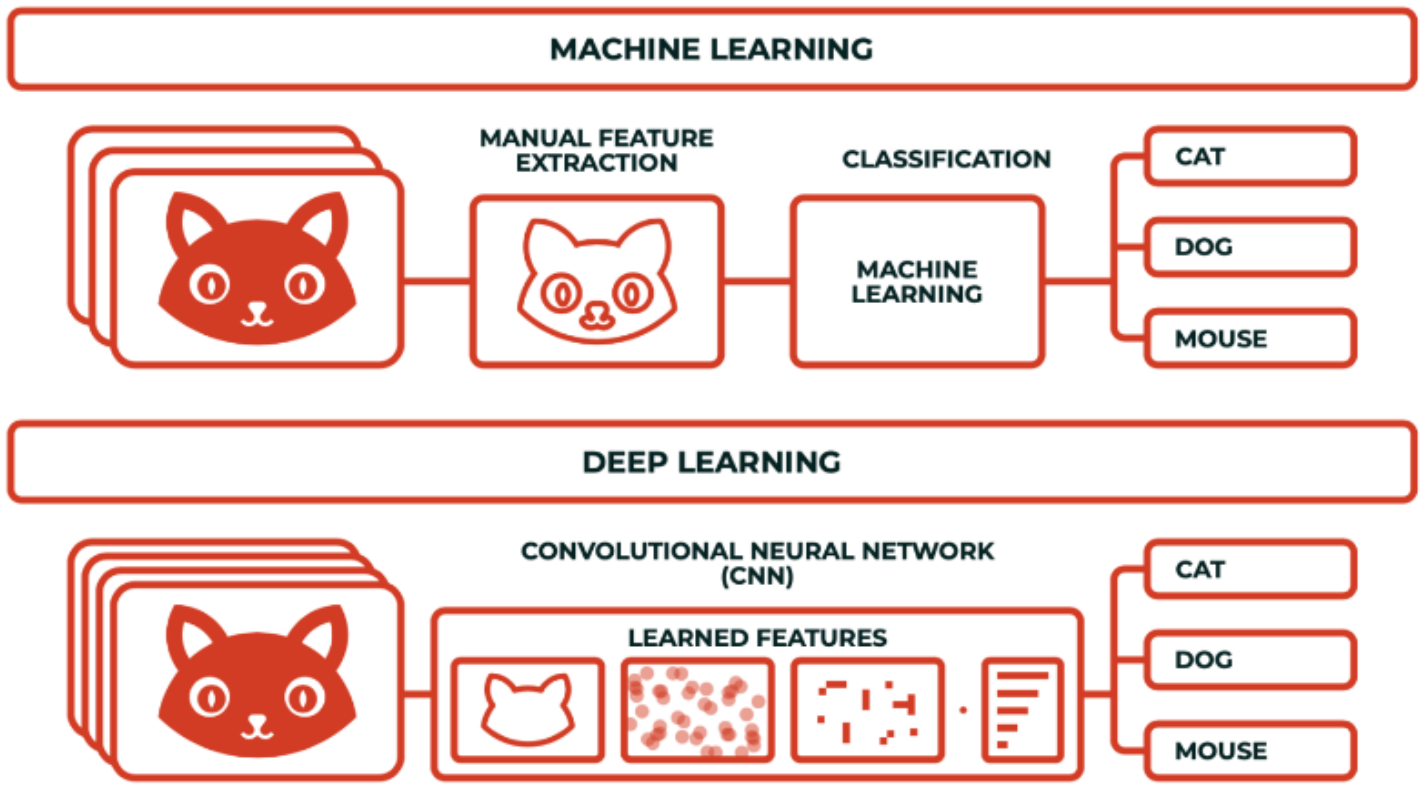




- Works on the idea of forward and back propagation.

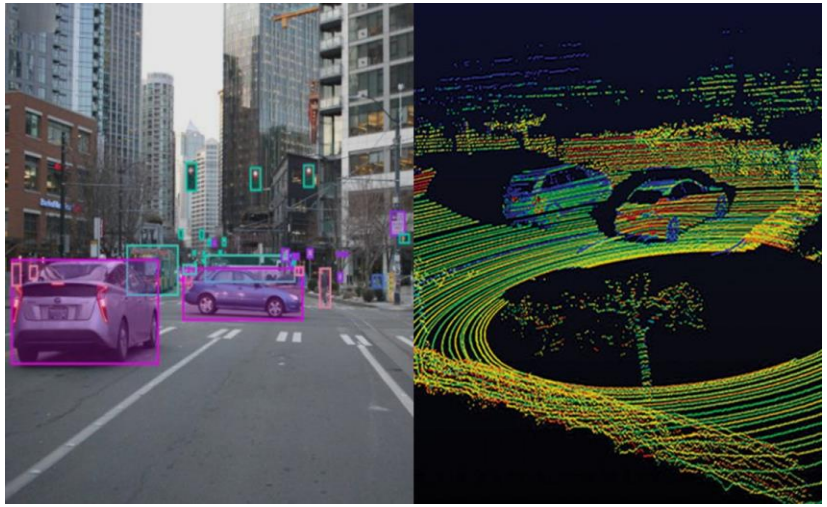
How are ML DL and AI related?

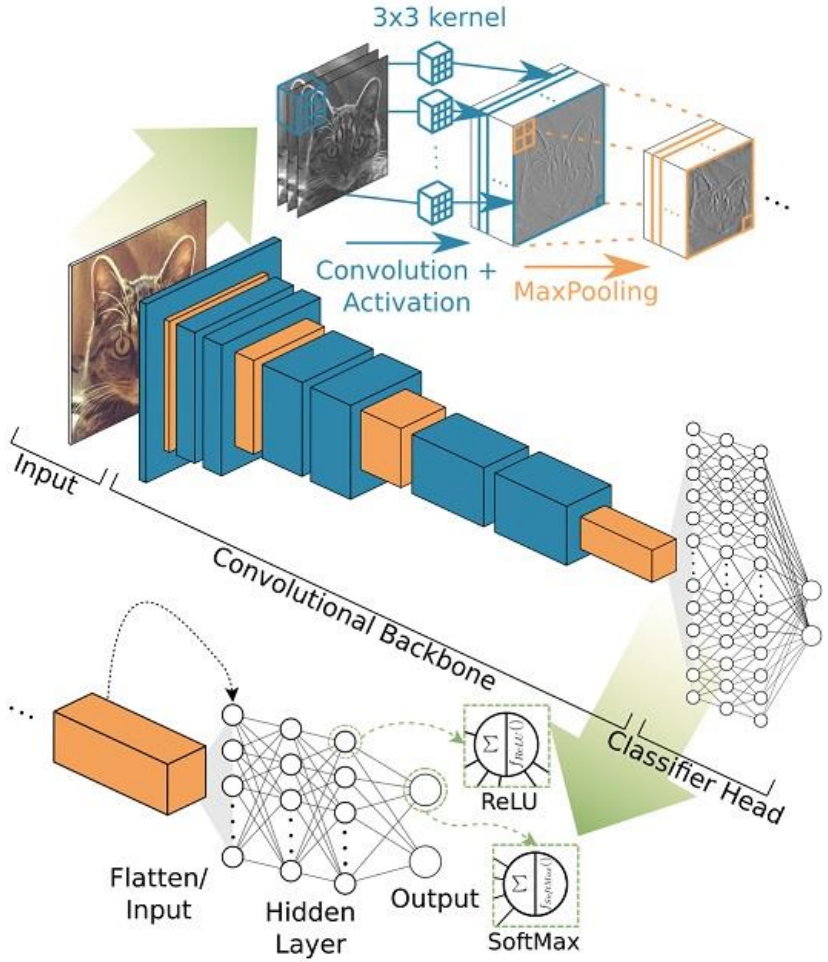



MACHINE LEARNING
MANUAL FEATURE EXTRACTION
CLASSIFICATION
MACHINE LEARNING
CAT
DOG
MOUSE
DEEP LEARNING
CONVOLUTIONAL NEURAL NETWORK (CNN)
LEARNED FEATURES
CAT
DOG
MOUSE

Applications of DL– Computer Vision

- Tesla





- Healthcare System

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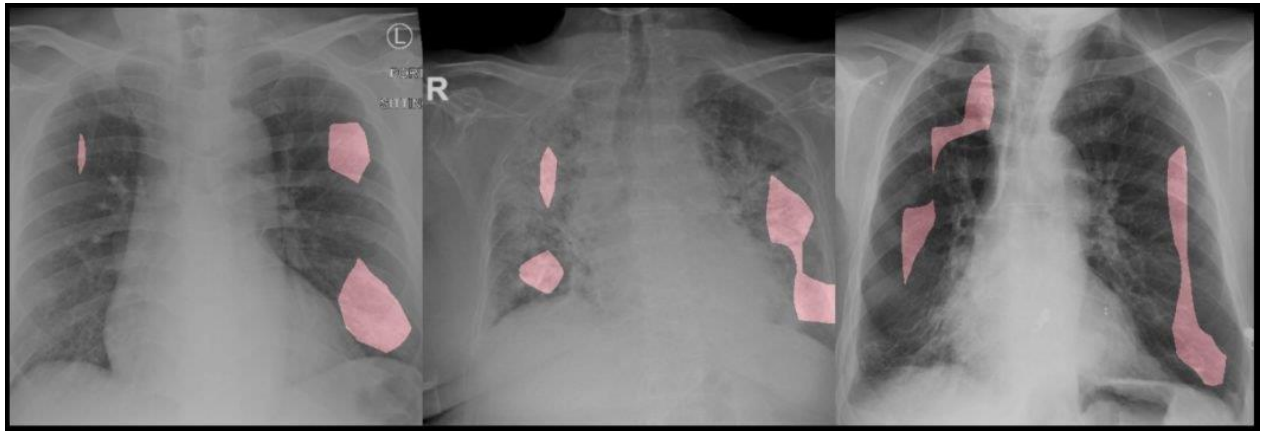


- Image Super Resolution

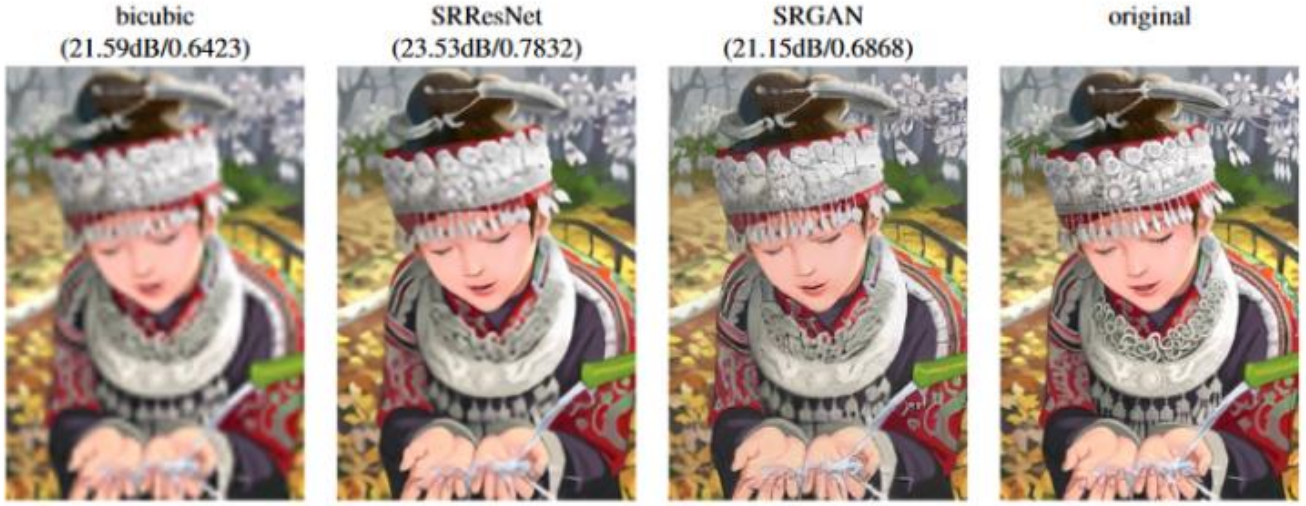


Figure 2: From left to right: bicubic interpolation, deep residual network optimized for MSE, deep residual generative adversarial network optimized for a loss more sensitive to human perception, original HR image. Corresponding PSNR and SSIM are shown in brackets. [4× upscaling]

Natural Language Processing

- Everything we express (either verbally or in written) carries huge amounts of information. The topic we choose, our tone, our selection of words, everything adds some type of information that can be interpreted and value extracted from it.
- In theory, we can understand and even predict human behavior using that information.
- Deep Learning has allowed for easier cognitive analysis of human languages i.e. we can now understand the context, and figure of speech like irony, or even perform sentiment analysis

Define NLP & it’s usecases

- **Natural Language Processing** or NLP is a field of Artificial Intelligence that gives the machines the ability to read, understand and derive meaning from human languages.
- NLP enables the recognition and **prediction of diseases** based on electronic
- Organizations can determine what customers are saying about a service or product by identifying and extracting information in sources like social media. This **sentiment analysis** can provide a lot of information about customers choices and their decision drivers. health records and patient’s own speech.

Is it always reliable?

- But serious controversy is around the subject. A couple of years ago Microsoft demonstrated that by analyzing large samples of search engine queries, they could identify internet users who were suffering from pancreatic cancer even before they have received a diagnosis of the disease. How would users react to such diagnosis? And what would happen if you were tested as a false positive? (meaning that you can be diagnosed with the disease even though you don't have it).
- This recalls the case of Google Flu Trends which in 2009 was announced as being able to predict influenza but later on vanished due to its low accuracy and inability to meet its projected rates.

Why am I interested in NLP?

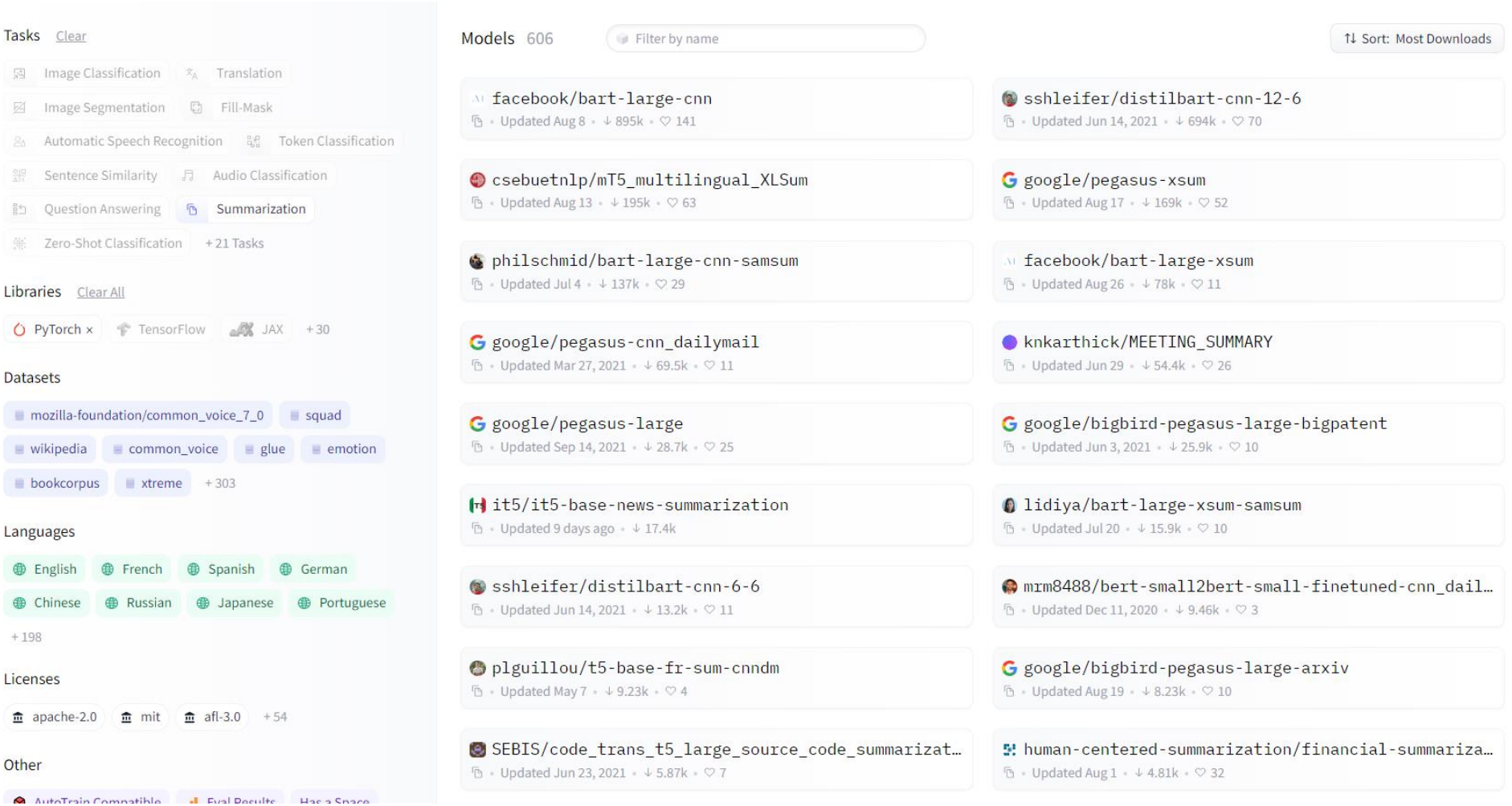
- An inventor at IBM developed a **cognitive assistant** that works like a personalized search engine by learning all about you and then remind you of a name, a song, or anything you can't remember the moment you need it to.
- NLP has a huge potential in the metaverse – VR Handheld Controller

What do you need to know in NLP?

- Basic Python obv!!
- Basic concepts surrounding NLP – we have NLTK library for that

1. Bag of words + TF-IDF : Model to find total weighted words
2. Tokenization : creating tokens out texts (removes punctuations)
3. Stop Word Removal : less advisable
4. Stemming : removing affixes eg astrobiology to Astro + biology
5. Lemmatization : bringing words to base form
6. Word Embeddings: using neural network to create a vector

Models: LSTM, Transformers (BERT)



Tasks

Problems solvers

Thousands of creators work as a community to solve Audio, Vision, and Language with AI.

Explore tasks

Audio Classification	Image Classification	Object Detection	Question Answering	Summarization	Text Classification	Translation
193 models	1,023 models	74 models	2,412 models	612 models	11,156 models	1,761 models

Open Source

Transformers

Transformers is our natural language processing library and our hub is now open to all ML models, with support from libraries like Flair, Asteroid, ESPnet, Pyannote, and more to come.

Read documentation

huggingface@transformers:~

```
from transformers import AutoTokenizer, AutoModelForMaskedLM
tokenizer = AutoTokenizer.from_pretrained("bert-base-uncased")
model = AutoModelForMaskedLM.from_pretrained("bert-base-uncased")
```

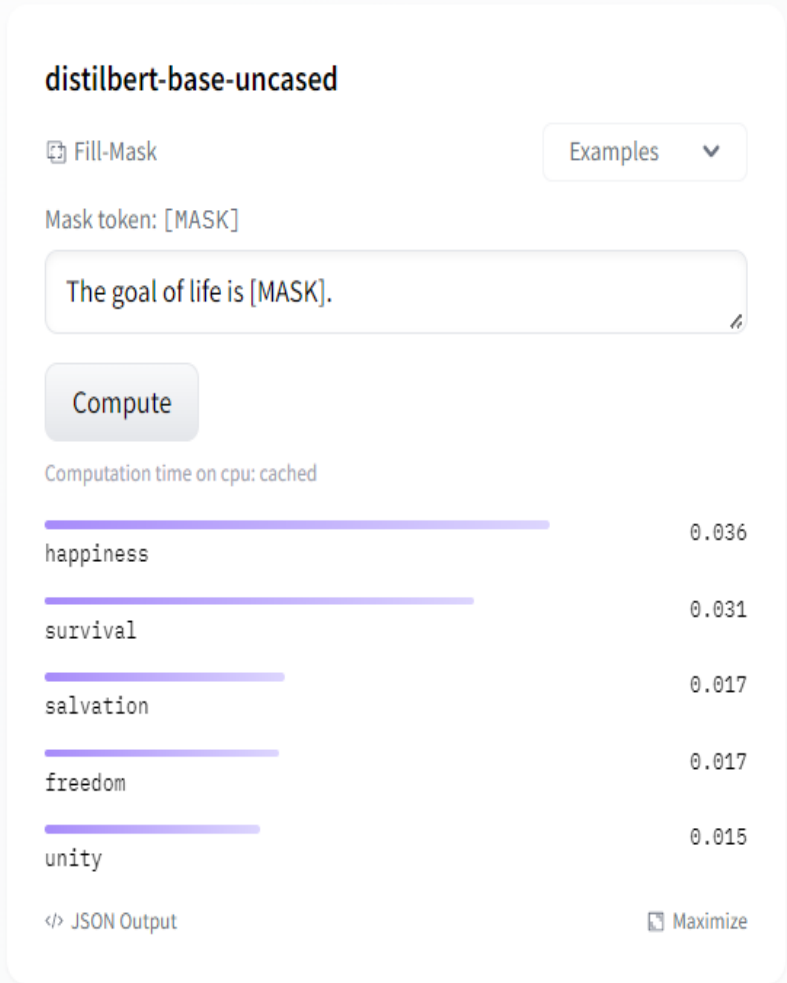
API

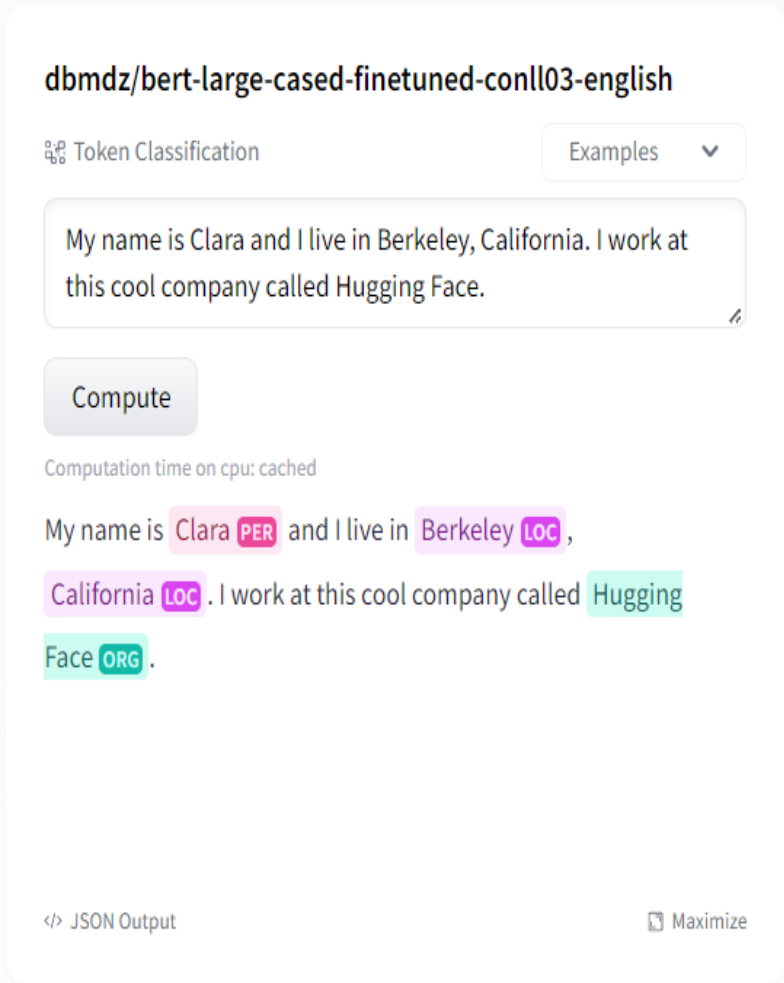
On demand

Inference API

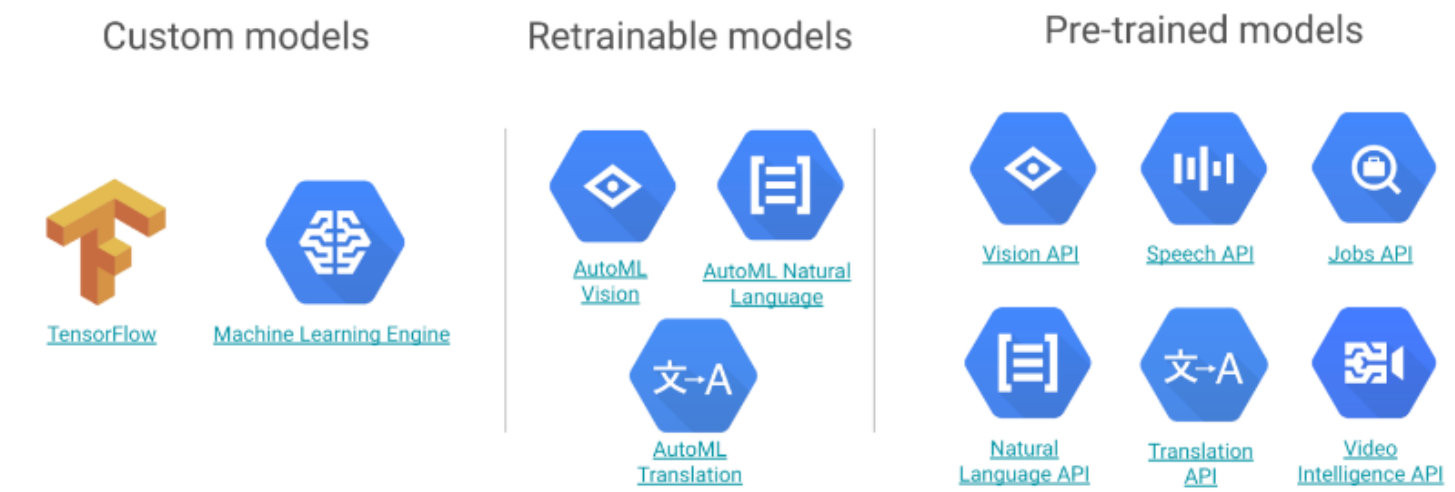
Serve your models directly from Hugging Face infrastructure and run large scale NLP models in milliseconds with just a few lines of code.

Learn more

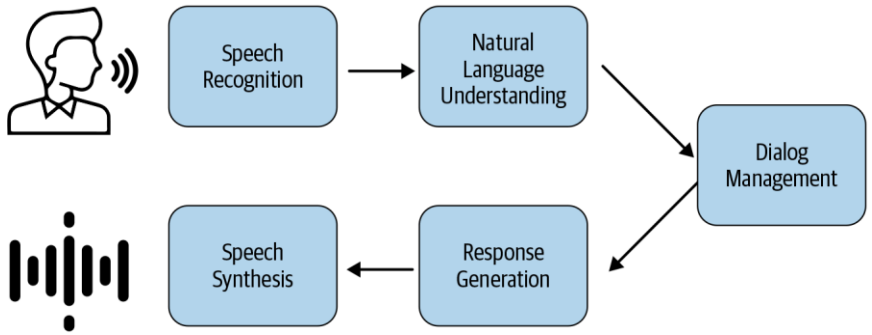




ML Tools


Custom models
Retrainable models
Pre-trained models
TensorFlow
Machine Learning Engine
AutoML Vision
AutoML Natural Language
AutoML Translation
Vision API
Speech API
Jobs API
Natural Language API
Translation API
Video Intelligence API
Update: New products added!

Project Flow



Sentiment Analysis