sk_k AI Resource Guide:

@github.com/s-ai-kia | SAIKIA | AI Overview & AppliedAI

Introduction

Artificial Intelligence is about mimicking the human senses to its truest forms:

❖ COMPUTER VISION   < What we see
❖ NATURAL LANGUAGE PROCESSING   < What we speak, read or hear
❖ REINFORCEMENT LEARNING   < How we learn from experience
❖ AUGMENTED REALITY   < Digital twin of the environment where we live
❖ ROBOTICS   < What we can touch
❖ SENSOR FUSION & EDGE ELECTRONICS   < How we feel, smell and taste
❖ MACHINE LEARNING < learn about the world around us
    — SUPERVISED LEARNING < give labels & information
    — UNSUPERVISED LEARNING < let ML algo find patterns itself
    — META LEARNING < learn about the learnings of the world around us

In addition:

❖ SYSTEMS and DATA CENTER   < How we remember and make use of known tools
❖ MATHEMATICS   < rule of nature that governs patterns and logic
❖ SOFTWARE ENGINEERING   < full stack platform
❖ CYBER SECURITY < digital security

Intro blog : history of ai, intro to ai, adeshpande (cnn), colah, intro to nlp, intro to rl, ros cv, robotics

MACHINE LEARNING TASKS:

Classification
Classification algorithms are used when you have a dataset of observations where we'd like to use the features associated with an observation to predict its class.
Example: Predict the type of flower when provided information on sepal length, sepal width, color, petal width, and petal length.
+ Naive Bayes
+ Logistic Regression
+ Decision Trees
+ K-Nearest Neighbors
+ Support Vector Machines
+ Random Forests
+ Boosted Trees

Regression

Regression algorithms are used when you have a dataset of observations where you'd like to use the features to predict a continuous output.

Example: Predict the price of a house using the following features: sq ft, number of rooms, zip code, age of house, school district.

+ **Linear Regression**
+ Polynomial Regression
+ Decision Trees
+ K-Nearest Neighbors
+ Random Forests
+ Boosted Trees
+ Gaussian Process Regression

Clustering

Clustering is a popular technique to find groups or segments in your data that are similar. This is an unsupervised learning algorithm in the sense that you don't train the algorithm and give it examples for what you'd like it to do, you just let the clustering algorithm explore the data and provide you with new insights.

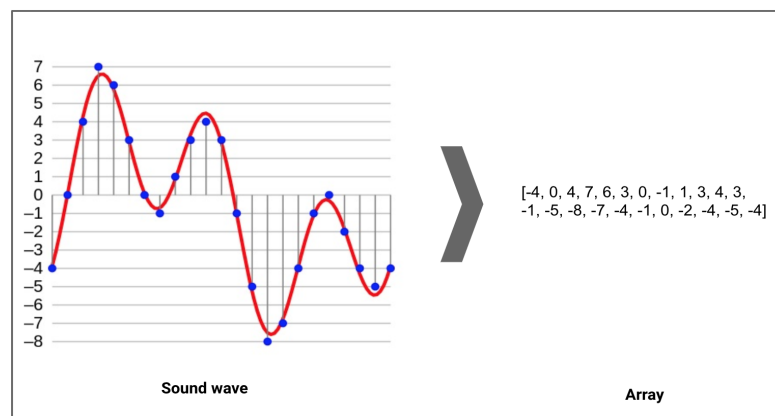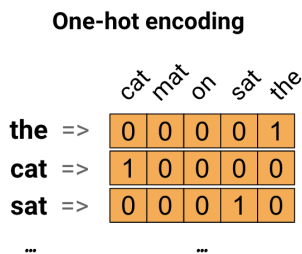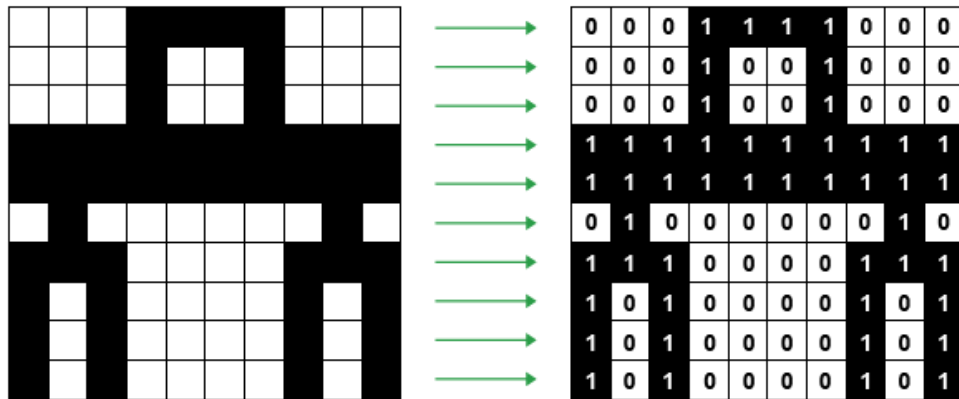+ K-means clustering
+ Soft clustering with Gaussian mixture models

ML Algo Mindmap, A tour of ML Algorithms, ML algo in Python
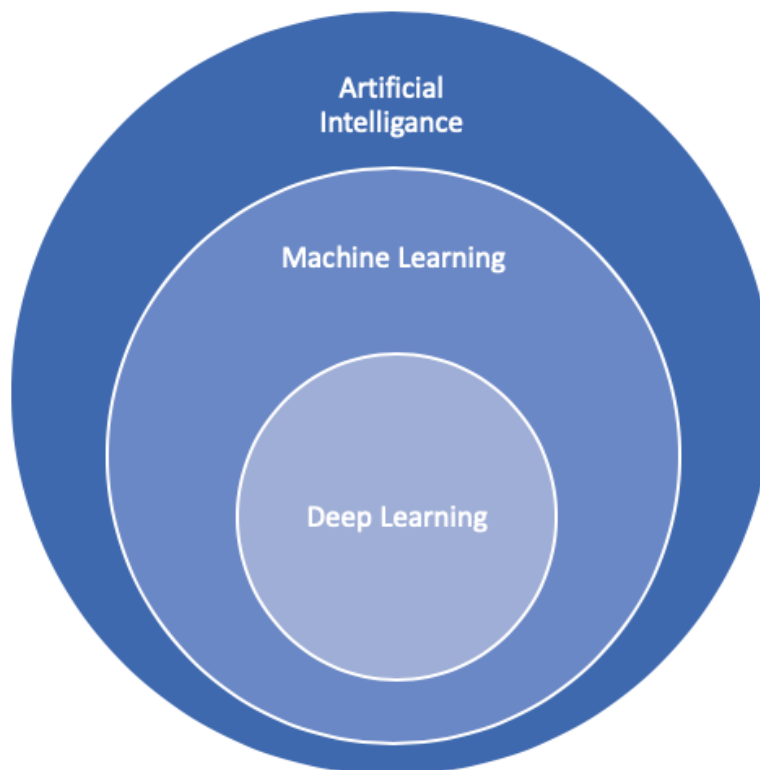
DATA:

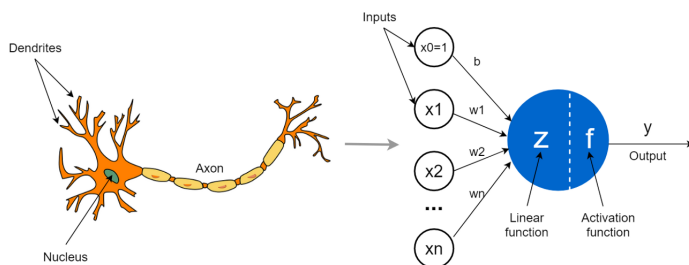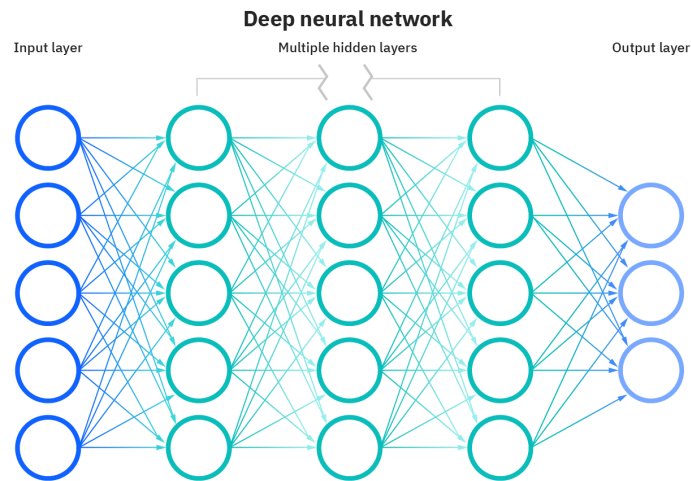Everything in CS is 0 or 1. Life has been binary!

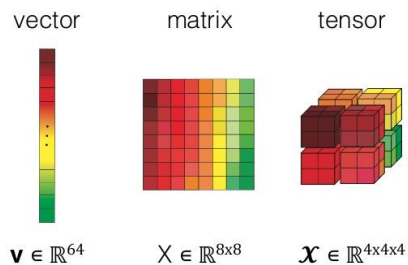Most common: Image / Video / Audio / Text / etc (other formats)

0	0	0	1	1	1	1	0	0	0	
0	0	0	1	0	0	1	0	0	0	
0	0	0	1	0	0	1	0	0	0	
1	1	1	1	1	1	1	1	1	1	
1	1	1	1	1	1	1	1	1	1	
0	1	0	0	0	0	0	0	1	0	
1	1	1	0	0	0	0	1	1	1	
1	0	1	0	0	0	0	1	0	1	
1	0	1	0	0	0	0	1	0	1	
1	0	1	0	0	0	0	1	0	1	

One-hot encoding

		cat	mat	on	sat	the
the	=>	0	0	0	0	1
cat	=>	1	0	0	0	0
sat	=>	0	0	0	1	0
…			…			

[-4, 0, 4, 7, 6, 3, 0, -1, 1, 3, 4, 3,
-1, -5, -8, -7, -4, -1, 0, -2, -4, -5, -4]

Sound wave

Array

Inputs

x0=1   b

x1   w1

x2   w2   z | f   y
                           Output
…   wn

xn

Dendrites

Axon

Nucleus

Linear function   Activation function

Deep neural network

Input layer   Multiple hidden layers   Output layer

Tensors:

tensor = multidimensional array

vector   matrix   tensor

$\mathbf{v} \in \mathbb{R}^{64}$ $X \in \mathbb{R}^{8 \times 8}$ $\mathcal{X} \in \mathbb{R}^{4 \times 4 \times 4}$

Scalar Vector Matrix   Tensor

Tensors flow in Neurons :) Neural Network! (Mimicking the Electrical Signals)

PRACTICAL:

Play with Tensors! == Python

Mathematics: Linear Algebra
Tool: Python + PyTorch/ TensorFlow
Environment: Anaconda

Application: Computer Vision Application, NLP Applications, Reinforcement Learning, RL Application 2, Deep RL Application
Mind Maps: Mindmap, Mindmap 1, Mindmap 2 cc

News: (Headlines)

+ Deepmind [AI Finally Enters the Real World!](#), [Reduce Cooling Bill by 40%](#)
+ Stable Diffusion - [Art with AI](#), [Art with AI 2](#), [Music Video](#), [Music Video 2](#), We are entering a world beyond designers : [Voyage through time](#), [Dream Textures](#). Ai generated paintings [1](#), [2](#) , [3](#); [2d to 3d](#); Music by AI : [1](#), [2](#) : A different logistics system. : [Olivio](#). [3D printed house](#), [3D printed rockets](#)!
+ Lenia : [Mathematical Life Forms](#), [Neat AI does LENIA](#), [ML in Lenia](#), lenia [blog](#), [Stanford Seminar](#)
+ [Alphafold](#), [Alphacode](#), [Gopher](#), [GPT-3](#), [Animation with DL](#), [Real time render](#), [Game physics](#), [Virtual characters](#), [Physics based animation](#)
+ Deepfakes : [Everybody Dance Now](#), [Rewrite videos by editing text](#), [Clone voice in 5 sec](#)
+ Boston Dynamics : [Atlas](#), [Search for Life](#), [Spot](#), [Spot's on it!](#)
+ ROBOTICS: [Ameca facial motion capture](#), [Ameca conversation using GPT 3 - Will robots take over the world?](#) , [Boston Dynamics](#), [Robo Threads](#), [Festo Bionic Robots](#), Swarm drones : [1](#), [2](#), [3](#), [4](#), [Deep sea soft robotics](#), [OceanOneK](#), [Snake Robots](#), [Cyborg Insects](#), [Insect Robot](#), [Soft Robotics Clothing](#), [soft robotic fish](#), [Sensitive skin for robotics](#), [nanobots](#), [bionic arm](#), [Xenobot 2.0](#), [stretch-self heal electronic](#), [ultrasonic sticker](#), [stretchy color shifting material](#).

News: [Seeing cell divisions like never before](#), [Detecting Signs of Disease from External Images of the Eye](#), [TFLite](#), [Why games are important](#)!, [AR Presentations](#), [MIT slime robot](#), [Google's AI See through dark](#), [Next Level Video Editing](#), [AI in Chemical Engineering](#), [Flying through Giga Berlin](#).

Sun is white! [Warp Drive](#)3D printed house. Some ambitious [future concepts](#).

[AGI](#) : Artificial General Intelligence

Open Source Software:

[BLOOM](#): https://bigscience.huggingface.co/blog/bloom

[Whisper](#): https://openai.com/blog/whisper/

Open Source Hardware: [Unitree Go1pro](#)

YOUTUBE CHANNELS:
+ [2 minute paper](#)
+ [StatQuest](#)
+ [3blue1brown](#) #some2
+ [sentdex](#)
+ [Yannic Kilcher](#)
+ [Lex Fridman](#)
+ [stanfordonline](#)

More Topics:
- [Basic NN](#), [Neural networks](#) (3b1b)
- [How are memories stored in Neural Networks](#)?
- [Loss function](#) , [LF 2](#), [Optimizers](#) / adaptive learning rate ([Gradient Descent](#), Adam, adagrad, adadelta, RMSProp etc), [Activation Function](#) (ReLU, sigmoid, tanh etc).

ML interview ques: [article 1](#), [article 2](#), [article 3](#), [ML Design Interview](#), [article 5](#)

Into AI Courses: [ML Specialization](#), [Deep Learning Specialization](#), [Mathematics for ML](#)

AI Resources :

BOOKS:

Count	Book Title	Link	Relevance (künstliche intelligenz)
*	100 page Machine Learning book	https://www.amazon.de/-/en/Andriy-Burkov/dp/199957950X	KI: Overview
1	Neural Network Learning: Theoretical Foundations	https://www.amazon.de/-/en/Martin-Anthony/dp/052157353X	KI : Neural Networks
2	Probabilistic Graphical Models: Principles and Techniques	https://www.amazon.de/-/en/Daphne-Koller/dp/0262013193	KI : Probabilistic Graphical Models
3	Deep Learning (Adaptive Computation and Machine Learning series)	https://www.amazon.de/-/en/Ian-Goodfellow/dp/0262035618/	KI : Deep Learning
4	Pattern Recognition and Machine Learning (Information Science and Statistics)	https://www.amazon.de/-/en/Christopher-M-Bishop/dp/0387310738	KI : ML Pattern Recognition
5	The Elements of Statistical Learning: Data Mining, Inference, and Prediction	https://www.amazon.de/dp/0387848576/	KI : Statistical Data Mining
6	Artificial Intelligence: A Modern Approach	https://www.amazon.de/-/en/Stuart-J-Russell/dp/1292153962/	KI : AI Foundation

7	Machine Learning: A Probabilistic Perspective	https://www.amazon.de/-/en/Kevin-P-Murphy/dp/0262018020	KI : Probabilistic ML
8	Mathematics for Machine Learning	https://www.amazon.de/-/en/Marc-Peter-Deisenroth/dp/110845514X	KI: Mathematics for ML
9	Reinforcement Learning: An Introduction (Adaptive Computation and Machine Learning series)	https://www.amazon.de/-/en/Richard-S-Sutton/dp/0262039249/	KI: Reinforcement Learning
10	Generative Deep Learning: Teaching Machines to Paint, Write, Compose, and Play	https://www.amazon.de/-/en/David-Foster/dp/1492041947	KI: Generative Adversarial Networks

Extra: Sentdex Neural Network from Scratch, Machine Learning Mastery, Statista In-depth AI 2021

AI Courses:

STANFORD AI SYLLABUS:

Course Code	Course Name	Description	(What can I offer after completion)
CS 221	Artificial Intelligence: Principle & Techniques	AI foundation course	Strong AI foundation & ethics

EE 364A	Convex Optimization I	This course is about optimization and performance which covers convex sets, functions, and optimization problems. Least-squares, linear and quadratic programs, semidefinite programming, and geometric programming. Numerical algorithms for smooth and equality constrained problems; interior-point methods for inequality constrained problems.	Optimized and hyper tuned Machine Learning models.
EE 364B	Convex Optimization II	Topics: Subgradient, cutting-plane, and ellipsoid methods. Decentralized convex optimization via primal and dual decomposition. Monotone operators and proximal methods; alternating direction method of multipliers. Exploiting problem structure in implementation. Convex relaxations of hard problems. Global optimization via branch and bound. Robust and stochastic optimization.	Optimized and hyper tuned advanced Machine Learning models.
CS 149	Parallel Computing	Topics: varieties of parallelism in current hardware (e.g., fast networks, multicore, accelerators such as GPUs, vector instruction sets), importance of locality, implicit vs. explicit parallelism, shared vs. non-shared memory, synchronization mechanisms (locking, atomicity, transactions, barriers), and parallel programming models (threads, data parallel/streaming, MapReduce, Apache Spark, SPMD, message passing, SIMT, transactions, and nested parallelism).CUDA,	Parallel Computing is essential to harness the compute power of every hardware resource available for faster, optimized Machine Learning model training. Parallel computing skills is an imperative skill in Machine Learning.

CS 229	Machine Learning	Foundational Machine Learning course. Topics include : statistical pattern recognition, linear and non-linear regression, non-parametric methods, exponential family, GLMs, support vector machines, kernel methods, deep learning, model/feature selection, learning theory, ML advice, clustering, density estimation, EM, dimensionality reduction, ICA, PCA, reinforcement learning and adaptive control, Markov decision processes, approximate dynamic programming, and policy search.	Strong ML foundation and great standards in project. Intuitive approach for ML projects. Most of the geo data are tabular/geojson and machine learning models are very essential to find patterns within these data.
CS 224N	Natural Language Processing with Deep Learning	Methods for processing human language information and the underlying computational properties of natural languages. Focus on deep learning approaches: understanding, implementing, training, debugging, visualizing, and extending neural network models for a variety of language understanding tasks. Exploration of natural language tasks ranging from simple word level and syntactic processing to coreference, question answering, and machine translation.	Expertise in Natural Language Processing. Natural Language Processing tasks include test summarization, sentiment analysis, fake news detection, toxic hate speech detection, chat bots, language translation etc.
CS 224W	Machine Learning with Graphs	Many complex real life data can be represented as a graph of relationships between objects. Topics include: Representation Learning and Graph Neural Networks; algorithms for the World Wide Web; reasoning over Knowledge Graphs; influence maximization; disease outbreak detection, social network analysis.	Real Life problem situations can be represented as graphs and Machine Learning algorithms can be developed to find insights of data. Maps are graphs and we represent a lot of geo/civil situations as graph problems. Example: event analysis : location of a sensor/event, civil structure analysis, automation of inventory management, road network analysis etc.

CS 228	Probabilistic Graphical Models: Principles and Techniques	Probabilistic graphical models are a powerful framework for representing complex domains using probability distributions, with numerous applications in machine learning, computer vision, natural language processing and computational biology.	Real Life problem situations modeled in graph, involving probabilistic and uncertain outcomes, situations which need exact and approximate inference methods, estimation of parameters and structure of graphical models. Involves Statistics, Probability and Mathematical programming of graphs. Example: Probabilistic prediction of weather, traffic accidents or prediction of events.
CS 234	Reinforcement Learning	Reinforcement learning is the process of running the agent through sequences of state-action pairs, observing the rewards that result, and adapting the predictions of the Q function to those rewards until it accurately predicts the best path for the agent to take. Reinforcement Learning is very important as it mimics the brain - process of learning through reward and feedback loop.	Expertise in Reinforcement Learning Problem Statements which find several widely used and unique use cases: Digital Twin simulation, Simulation of self driving cars, autonomous vehicle, power consumption optimization etc.
CS 231N	Convolutional Neural Networks for Visual Recognition	Computer Vision : image/video understanding, pixels, mapping, medicine, drones, and self-driving cars. Core to many of these applications are visual recognition tasks such as image classification and object detection. Convolutional Neural Networks.	Expertise in any problem statement or project involving image, 3D maps, video, point cloud, heat map data etc. Image Segmentation, Object Tracking & Detection etc.
CS 330	Deep Multi-task and Meta Learning	This includes: goal-conditioned reinforcement learning techniques that leverage the structure of the provided goal space to learn many tasks significantly faster(multi task); meta-learning methods that aim to learn efficient learning algorithms that can learn new tasks quickly; curriculum and lifelong learning, where the problem requires learning a sequence of tasks, leveraging their shared structure to enable knowledge transfer.	Expertise in projects involving multi agent systems such as traffic flow, public community, connected events, sports: football, chess, go etc. There have been wide use cases of multi agent RL : DeepMind reduces cooling bill by 40% etc.

CS 237A	Principles of Robot Autonomy I	Basic principles for endowing mobile autonomous robots with perception, planning, and decision-making capabilities. Algorithmic approaches for robot perception, localization, and simultaneous localization and mapping; control of non-linear systems, learning-based control, and robot motion planning; introduction to methodologies for reasoning under uncertainty, e.g., (partially observable) Markov decision processes. Extensive use of the Robot Operating System (ROS) for demonstrations and hands-on activities.	Expertise in mobile autonomous drones/robots; aerial and ground based robotics systems.
CS 237B	Principles of Robot Autonomy II	This course teaches advanced principles for endowing mobile autonomous robots with capabilities to autonomously learn new skills and to physically interact with the environment and with humans. It also provides an overview of different robot system architectures. Concepts that will be covered in the course are: Reinforcement Learning and its relationship to optimal control, contact and dynamics models for prehensile and non-prehensile robot manipulation, imitation learning and human intent inference, as well as different system architectures and their verification.	Expertise in mobile autonomous drones/robots; aerial and ground based robotics systems.

CS 238	Decision Making under Uncertainty	Introduces decision making under uncertainty from a computational perspective and provides an overview of the necessary tools for building autonomous and decision-support systems. Following an introduction to probabilistic models and decision theory, the course will cover computational methods for solving decision problems with stochastic dynamics, model uncertainty, and imperfect state information. Topics include: Bayesian networks, influence diagrams, dynamic programming, reinforcement learning, and partially observable Markov decision processes. Applications cover: air traffic control, aviation surveillance systems, autonomous vehicles, and robotic planetary exploration.	Expertise in developing complex situation aware mobile and advanced autonomous systems. Modelling real situational awareness in terms of mathematics for uncertain situations in projects.
CS 233	Geometric and Topological Data Analysis	Mathematical and computational tools for the analysis of data with geometric content, such images, videos, 3D scans, GPS traces -- as well as for other data embedded into geometric spaces. Linear and non-linear dimensionality reduction techniques. Graph representations of data and spectral methods. The rudiments of computational topology and persistent homology on sampled spaces, with applications. Global and local geometry descriptors allowing for various kinds of invariances. Alignment, matching, and map/correspondence computation between geometric data sets. Annotation tools for geometric data. Geometric deep learning on graphs and sets. Function spaces and functional maps. Networks of data sets and joint learning for segmentation and labeling.	Data Analysis of geometric and topological data widely used in geo and civil industries. This is a very important course for big data processing and data analysis : GeoAI.

Notes: shervine

More Amazing AI Courses:

CMU : Multimodal ML	CMU : Neural Nets for NLP	CS 233 : Geometric & Topological Data Analysis	MIT 18.065 : Matrix Methods in Data Analysis, Signal Processing, and Machine Learning	MIT : Deep Learning for Life Sciences
MIT : Machine Vision	MIT : ML for Genomics	MIT : Underactuated Robotics	UC Berkeley 287 : Advanced Robotics	MIT : Deep Learning

ai-ml-dl topic (KI)	description	discussion
conferences	**Conferences:** Premier AI conferences: + CVPR : IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR) + ICML : International Conference on Machine Learning (ICML) + NeurIPS : Neural Information Processing Systems (abbreviated as NeurIPS) + ECCV : European Conference on Computer Vision (ECCV) + ICLR : The International Conference on Learning Representations (ICLR) + IROS : IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) + RSS : Robotics: Science and Systems (RSS) + NVIDIA GTC : (GPU Technology Conference) is a global AI conference. + Google Cloud Applied ML Summit : Google Cloud AI technologies + AAMAS : ACM AAMAS (International Conference on Autonomous Agents and Multiagent Systems) is the largest and most influential conference in the area of agents and multiagent systems. there are also good platforms to find research publications : arXiv, google scholar : robotics, artificial intelligence, computer vision and pattern recognition, Google Quantum AI summer symposium etc.	Staying updated with cutting edge KI research work from premier KI conferences and publications will open up new project possibilities and innovate our thought process.

| competitions/ hackathons | **Competitions:**
Premier AI challenges and competitions:
- mlcontests : ml challenges and competitions list
- kaggle competitions : mainly supervised ML/data science competitions, but also feature simulation competitions which can be good problems for RL. e.g - Jane Street Market Prediction — $100,000 etc.
- AICrowd : runs a combination of supervised ML competitions as well as RL competitions.
- AWS deepracer : AWS DeepRacer is a beginner-friendly 3D racing simulator aimed at helping developers get started with RL.
- SC2 AI Arena : Starcraft II AI arena for RL algorithms
- Gocoder.one : Coder One is an AI competition based on the classic console game, bomberman.
- flatland : Flatland is an annual competition featured as part of NeurIPS 2020. It is designed to tackle the problem of efficiently managing dense traffic on complex railway networks. The goal is to construct the best schedule that minimizes the delay in the requested arrival time of all trains.
- MineRL : MineRL is concerned with the development of sample-efficient deep RL algorithms which can solve hierarchical, sparse reward environments using human demonstrations in Minecraft.
- nethack : NetHack is another annual competition at NeurIPS 2021 held on AICrowd. Teams compete to build the best agents to play NetHack, an ASCII-rendered single-player dungeon crawl game. NetHack features procedurally-generated levels, with hundreds of complex scenarios, making it an extremely challenging environment for current state-of-the-art RL.
- CompilerGym : CompilerGym is actually a toolkit for applying reinforcement learning to compiler optimizations, rather than a competition.
- ods.ai : ml competition platform
- bitGrid : Bitgrit is a data science competition platform. Bitgrit has hosted several AI competitions including one to predict foreign exchange rates and another to optimize the algorithm for a profile-matching mobile app.
- numer.ai : Numer ai is, according to their website, "The hardest data science tournament on the planet", it's backed by Union Square Ventures, the co-founder | We can observe AI competitions and different problem statements / challenges faced by different industries including construction and mobility to understand solution approaches across the globe. |

of Renaissance, and the co-founder of Coinbase. The main idea of the tournament is to build the world's open hedge fund by modeling the stock market.
- drivendata : DrivenData brings cutting-edge practices in data science and crowd-sourcing to some of the world's biggest social challenges and the organizations taking them on. e.g : MagNet: Model the Geomagnetic Field.
- battlecode : The MIT 6.147 (formerly 6.370) Battlecode programming competition is a unique challenge that combines battle strategy, software engineering, and artificial intelligence.
There are also lot of conference competitions happening every year.
- xeek.ai : Xeek.ai challenges, unite the Data and Geoscience communities which include leading data scientists, developers, geoscientists, and machine learning specialists — around the shared goal of crowdsourcing innovative solutions that solve energy's largest challenges.
- dPhi : DPhi is a community with a vision to build data culture and democratize Data Science learning.
- dataCrunch : DataCrunch a team of 42-Paris students and a former finance teacher from ESSEC Paris which aims to disrupt the Hedge Fund industry by building the first hedge fund run and owned by a community of data scientists!
- challenge data : Challenge Data website of ENS (École Normale Supérieure) of Paris and Collège de France, organizes challenges of data sciences from data provided by public services, companies, and laboratories. It is supported by the CFM chair and the PRAIRIE Institute.
- signate.jp : SIGNATE is the only platform in Japan that empowers the AI/Data Analytics talents through Data Science competitions to solve business problems faced by businesses and governments.
- grand-challenge : Grand Challenge is a platform for the end-to-end development of Machine Learning solutions in Bio-Medical Imaging. Most Advanced Research Challenges are posted on this amazing platform.

Hackathons: hackTUM, hackZurich, NASA Space app challenge etc

	news: - eBay's ml competition, science4cast, pytorch summer hack, esa socis etc.	
summer schools / workshops	**Summer Schools:** Summer Schools are focused training camps for different AI methods and this list has very popular and good AI summer schools. Some additional summer schools (mostly European): + MIT IDSS + LogML : London Geometry and ML + Nordic Probabilistic AI school + Summer schools in Europe + IDESSAI 2022 - SECOND JOINT SUMMER SCHOOL OF INRIA AND DFKI + The European AI Summit 2022 (***upcoming) additionally, Google events, IEEE & ACM Summer Schools, AI Residency programs: this list + Microsoft, Meta AI, Nvidia, Apple, OpenAI etc	Attending focused summer schools and events as per our project needs might help open a new realm of thought process leading to possibilities.

| training/ courses/ certifications | **AI Training:** Several premier professional AI training programs and certifications:
+ Stanford SCPD Graduate [AI Certificate](), [Robotics and Autonomous Systems]() certificate.
+ [MIT Professional Certificate Program]() in Machine Learning & Artificial Intelligence; [Designing and building AI products and services]()
+ [Udacity]() Nanodegree:
  > [School of Autonomous Systems]()
  > [School of Artificial Intelligence]()
+ Harvard Extension School : data science [graduate certificate]()
+ [NVIDIA training institute]() : Some example courses are - [Building Real-Time Video AI Applications](), [Building Video AI Applications at the Edge on Jetson Nano]() etc
+ AI resources from Google : Google Cloud ML & AI Engineer [path](), [Grow with Google](), [Google AI Experiments](), Google [AI Education](), Google [Quantum AI](), Google [Developer Experts : AI]()
+ TensorFlow Learn ML [resources]() & TensorFlow [courses]()
+ Deepmind Learning [resources]()
+ [Using Python for Research]() (beginner)

There exists very good AI blogs such as: [AppliedAI: AI in mobility]() (***), Google [AI blogs](), [machinelearning mastery](), [c-olah blog](), [BAIR](), [MIT Technology Review](), Guardian's [AI section](). Here is an updated list of all [AI seminars]() and this [medium article]() summarizes many resources. Also some important youtube AI channels with good content - [StatQuest](), [Yannic Kilcher](), [2 minutes paper](), [3blue1brown](), [stanfordonline](), [sentdex]() etc.

Professional Certifications:
+ [EITCA - AI]() : European Artificial Intelligence Certificate (***)
+ [Google Cloud Professional ML Engineer]()
+ [Microsoft Azure AI Engineer Associate]()
+ [tensorflow developer certificate]()

AI Product Manager: [AI Product manager specialization](), [AI product manager nanodegree]() | Professional Certification from EU bodies, industry giants and academia power houses can help set end-2-end ethical AI standards in projects. |

| research labs /groups | AI Research Labs & Groups - International:
These are premier AI research labs who give out cutting edge AI possibilities:
> Stanford AI, MIT CSAIL , Berkeley AI Research (BAIR), CMU AI, CMU Robotics
> Laboratory for Vision and Artificial Intelligence (LIVIA), UPenn GRASP, EPFL - CIS, MLO Lab, MIT SparkLab
> JP Morgen AI Research Lab, Elkanio Research Labs, Tesla AI
> Microsoft AI Research, Meta AI (FAIR), Deepmind, OpenAI
Many premier AI research labs provide courses via coursera, edX, udemy etc

> Europe : ETH-Z, inria, IDSIA, Norwegian AI research consortium (NORA), Google AI Zurich, Apple AI Zurich, ETH-Z AI, ETH-Z Robotic System Lab, ETH-Z drone projects.

> NaverLabs Europe, Vision4AI.eu, ellis.eu (European Laboratory for Learning and Intelligent Systems), Institute of ethical AI and ML, Alan Turing Institute, sustainable-ai.eu, HPE HPC/AI EMEA RESEARCH LAB (ERL), EUROPEAN AI LANDSCAPE, Zurich NLP group, IDIAP.

> CLAIRE AI Network : All the best EU AI research labs are listed here in this document! (***)

> ALL EU AI startups: check this! it lists all AI startups in EU solving problems from different industries. We can also check AI use cases in different industries via AMAI AI experts.

AI Research Labs & Groups in Germany:
There are several KI research labs in Germany:
> German Research Center for Artificial Intelligence (Deutsches Forschungszentrum für Künstliche Intelligenz) : DFKI is the federal government body for KI : This DFKI - Robotics Innovation Center is nearby in Bremen.

x Several other important AI centres : TÜBINGEN AI CENTER , KI-Berlin, KI.NRW, appliedAI.de, Network of | Critical Overview information about AI landscape in Europe > Germany > Hamburg from academia to government institutions. |

[National Centres of Excellence for AI Research](#)

This is such a beautiful document to understand [ai research in germany](#). check this document!!

also [cyber-valley](#) : is Europe's largest research consortium in the field of artificial intelligence The state of Baden-Württemberg, the Max Planck Society with the Max Planck Institute for Intelligent Systems, the Universities of Stuttgart and Tübingen as well as Amazon, BMW AG, IAV GmbH, Mercedes-Benz Group AG, Dr. Ing. hc F. Porsche AG, Robert Bosch GmbH and ZF Friedrichshafen AG are the founding partners of this initiative. In addition, the Fraunhofer-Gesellschaft is a Cyber Valley partner. Cyber Valley is also supported by the Christian Bürkert Foundation, the Gips-Schüle Foundation, the Vector Foundation and the Carl Zeiss Foundation.

> TUM [Vision groups](#), [AI4EO](#) (Artificial Intelligence for Earth Observation), [Bosch AI](#), [IBM research](#), [Uni-Freiburg](#), [LeibnizAI Lab](#), [DLR Institute for Robotics and Mechatronics](#), TUD [AIML group](#). Saarbrücken and Tübingen seems to have lot of AI institutes.

AI Research Labs & Groups in Hamburg:
> ARtificial Intelligence Center Hamburg ([ARIC](#)), [AI.hamburg](#), TUHH AI [research publications](#), Universität Hamburg [AI & Robotics group](#).

topic	description	resource/link

ml services	There exists several ML services to speed up ml project planning, model development pipeline etc. We can take help from these services to reach our goals. Many of these services are open sourced while some are closed sourced with a price cap.	♣ paperswithcode : This is a very amazing platform where you get access to categorized state of the art research along with open source code (if available / published by authors in github). Based on the problem statement and requirement, we can filter the best research work done for the problem and get the open source code for applied ml.
		  + vision : https://paperswithcode.com/area/computer-vision
		  + NLP : https://paperswithcode.com/area/natural-language-processing
		  check every category here.
		
		♣ weights & biases : The developer-first MLOps platform Build better models faster with experiment tracking, dataset versioning, and model management.
		
		♣ AWS Sagemaker : Build, train, and deploy machine learning (ML) models for any use case with fully managed infrastructure, tools, and workflows.
		
		♣ IBM Watson Studio : Build and scale trusted AI on any cloud. Automate the AI lifecycle for ModelOps.
		
		♣ neptune.ai : Log, organize, compare, register, and share all your ML model metadata in a single place. Automate and standardize as your modeling team grows.
		
		♣ Google Vertex AI : Build, deploy, and scale ML models faster, with pre-trained and custom tooling within a unified artificial intelligence platform. Google provides a lot of ML services like AutoML, diagflow, deep learning containers etc, here is the list.
		
		♣ huggingface: Build, train and deploy state of the art models powered by the reference open source in machine learning.
		huggingface transformers : transformers for state of the art deep learning spaces.
		In Natural Language Processing:
		Masked word completion with BERT, Name Entity Recognition with Electra, Text generation with GPT-2, Natural Language Inference with RoBERTa,

		Summarization with BART, Question answering with DistilBERT, Translation with T5
		In Computer Vision:
		Image classification with ViT, Object Detection with DETR, Semantic Segmentation with SegFormer, Panoptic Segmentation with DETR
		In Audio:
		Automatic Speech Recognition with Wav2Vec2 Keyword Spotting with Wav2Vec2
		In Multimodal tasks:
		Visual Question Answering with ViLT huggingface knockknock: library to get a notification when your training is complete or when it crashes during the process with two additional lines of code.

| datasets | AI-ML-DL-Geo datasets: Datasets are imperative to train AI models and access to quality data is always demanding. I am mentioning the public datasets and search engines available. There are several private datasets as well but they come with a cost. | PUBLIC datasets:
- google dataset search
- kaggle dataset
- paperswithcode dataset
- openml-dataset
- nasa earth dataset (largest collection of geo-related datasets about the earth, climate and water bodies.)
- AWS opendata
- Azure opendata
- data.world
- huggingface
- UCI ML dataset
- datahub.io
- github/awesome-public-dataset
- govdata.de
- destatis.de
- data.gov
- visualdata.io (Computer Vision datasets)
- CMU library dataset , TUHH
x COMPUTER VISION datasets: xView, ImageNet, google open images, IMDB-wiki (annotated face images), dog-breed dataset, TUM
- kinetic 700-2020 (human poses from YT videos)
- cityscape (semantic segmentation)
- colors with RGB values.
x NLP datasets: quantumstat, QA, amazon reviews, rotten tomato reviews
x Sentiment analysis: IMDB reviews, stanford sentiment, twitter US airlines
x Self Driving car dataset: waymo, berkeley deepdrive, WPI dataset (traffic lights, pedestrian, and lane detection), bosch small traffic light, comma.ai (car's speed, acceleration, steering angle, and GPS coordinates), MIT driveseg, UCSD-LISA
x geo & satellite datasets: (very important for us):
- URBAN DATA PLATFORM : MetaVER, geoportal, transparenzportal, dlr eoc, GIS data, UCSC, geodaten
- satellite data: Copernicus, DLR
PRIVATE datasets:
- planet, arcGIS etc |

visualization	visualization of data, ml models are very essential to debug and reverse engineer technical difficulties. There exists several platforms for data visualization and having them in one place will speed up the development process.	Although this list, list2 has most of the data viz libraries but i'll list a few which will be relevant for our use cases.

❖ data visualization:

+ deck.gl : deck.gl is designed to simplify high-performance, WebGL-based visualization of large data sets. check out these use cases.

+ streetscape.gl : streetscape.gl is a toolkit for visualizing autonomous and robotics data in the XVIZ protocol. It is built on top of React and Uber's WebGL-powered visualization frameworks. Check this demo.

+ kepler.gl : github/Kepler.gl is a powerful web-based geospatial data analysis tool. Built on a high performance rendering engine and designed for large-scale data sets. kepler.gl is made from deck.gl.

+ sanddance : github/SandDance helps you find insights about your data with unit visualizations and smooth animated transitions. It uses deck.gl to render chart layouts described with Vega.

+ flowmapblue : FlowmapBlue is a free tool for representing aggregated numbers of movements between geographic locations as flow maps. It is used to visualize urban mobility, commuting behavior, bus, subway and air travels, bicycle sharing, human and bird migration, refugee flows, freight transportation, trade, supply chains, scientific collaboration, epidemiological and historical data and many other topics.

+ cartodb : With CARTO, you can upload your geospatial data (Shapefiles, GeoJSON, etc) using a web form and then make it public or private. After it is uploaded, you can visualize it in a dataset or on a map, search it using SQL, and apply map styles using CartoCSS.

+ cesiumJS: An open-source JavaScript library for world-class 3D globes and maps.

+ Alibaba L7 & L7plot : Large-scale WebGL-powered Geospatial Data Visualization analysis engine. L7plot is a large-scale geospatial visualization chart library.

+ datamaps: Customizable SVG map visualizations for the web in a single Javascript file using D3.js

❖ GIS python libraries:

+ geopandas : python tools for geographic data

+ RSGISlib : The Remote Sensing and GIS software library (RSGISLib) is a collection of tools for processing remote sensing and GIS datasets.
+ ipyleaflet : If you want to create interactive maps, ipyleaflet is a fusion of Jupyter notebook and Leaflet. You can control an assortment of customizations like loading basemaps, geojson, and widgets.
+ geemap : A Python package for interactive mapping with Google Earth Engine, ipyleaflet, and ipywidgets.
+ lidar : lidar is a Python package for delineating the nested hierarchy of surface depressions in digital elevation models (DEMs). It is particularly useful for analyzing high-resolution topographic data, such as DEMs derived from Light Detection and Ranging (LiDAR) data.
+ FOLIUM : Folium builds on the data wrangling strengths of the Python ecosystem and the mapping strengths of the Leaflet.js library. Manipulate your data in Python, then visualize it in a Leaflet map via folium
+ geoplot : geoplot is a high-level Python geospatial plotting library. It's an extension to cartopy and matplotlib which makes mapping easy: like seaborn for geospatial.

❖ **ml model visualization:**
+ NETRON : Netron is a viewer for neural network, deep learning and machine learning models.
+ cnn model structure summary with this code.
Tools to Design or Visualize Architecture of Neural Network : repo is a good list but i'll list down the few essentials.
+ Tensorboard : TensorFlow visualization toolkit.
+ PyTorchViz : PyTorch visualization kit.
+ visualkeras : Visualkeras is a Python package to help visualize Keras (either standalone or included in TensorFlow) neural network architectures. The keras.utils.vis_utils provides utility functions to plot a Keras model using Graphviz.

| open source AI projects | open source frameworks and ai projects by independent researchers / lead ai companies have taken the society by storm. There exists amazing AI frameworks and projects which might be handy in practice. | > caliban : Google Caliban is a tool that helps researchers launch and track their numerical experiments in an isolated, reproducible computing environment.
> kornia : Kornia is a differentiable computer vision library for PyTorch. It consists of a set of routines and differentiable modules to solve generic computer vision problems.
> intel analytics-zoo : Analytics Zoo is an open source Big Data AI platform, and includes the following features for scaling end-to-end AI to distributed Big Data:
  x Orca : seamlessly scale out TensorFlow and PyTorch for Big Data (using Spark & Ray)
  x RayonSpark : run Ray programs directly on Big Data clusters
  x BigDLextension: high-level Spark ML pipeline and Keras-like APIs for BigDL
  x Chronos: scalable time series analysis using AutoML
  x PPML: privacy preserving big data analysis and machine learning (*experimental*)
> mljar-supervised: The mljar-supervised is an Automated Machine Learning Python package that works with tabular data. It abstracts the common way to preprocess the data, construct the machine learning models, and perform hyper-parameters tuning to find the best model. Automatic Exploratory Data Analysis.
> deepdetect : open source ai platform written in c++ with readily available API, algorithms, models etc. supports state of the art algorithms - clustering with t-SNE, similarity search with annoy, FAISS. . templates for the most useful neural architectures (e.g. Googlenet, Alexnet, ResNet, convnet, character-based convnet, mlp, logistic regression, SSD, DeepLab, PSPNet, U-Net, CRNN, ShuffleNet, SqueezeNet, MobileNet, RefineDet, VOVNet, ...)
> RL FRAMEWORKS:
 + dopamine : Deep Reinforcement Learning Framework
 + deepmind lab : 3d env for DRL
> predictionio: Apache predictionio supports event collection, deployment of algorithms, evaluation, querying predictive results via REST APIs. It is based on scalable open source services like Hadoop, HBase (and other DBs), Elasticsearch, Spark and implements what is called a Lambda Architecture.
> detectron2: facebook's state of the art vision algorithm platform. |

> tflearn : high level API over tensorflow
> faceswap : open source deep fake library & also image manipulation libraries - pix2style2pix, avatarify, neural photo editor, GANimation.
> waveglow: NVIDIA waveglow for audio & speech synthesis
> neural-enhance: neural enhance is super resolution for frames
> real-time voice cloning: audio deep fakes, also mockingbird.
> fasttext: facebook fasttext allows users to efficiently learn word representation and text classification.
> deOldify: colorize, restore, and give new life to old images and film footage also microsoft's repo.
> NeuralTalk2 : is used to describe images and videos with sentences using Multimodal Recurrent Neural Network built on Python+numpy.
> face-recognition: real time face recognition. also yolo-v5.
> U GATIT: image to anime.
> srez : Image super-resolution using deep learning can upscale a 16x16 input image by a 4X factor, resulting in a 64x64 image.
> TecoGAN: video super resolution.
> CMU open-pose: first real-time multi-person system to jointly detect human body, hand, facial, and foot keypoints (in total 135 keypoints) on single images, also pose-animator.
> spaCy : industrial grade NLP in python.
> server: optimized cloud and edge inferencing solutions.
> back ground matting v2: real time background change
> skyAR: sky replacement with cycleGAN
> txtai: AI powered semantic search applications.
> Open Neural Network Exchange (ONNX) : is an open ecosystem that empowers AI developers to choose the right tools as their project evolves. They have a lot of models as well. also onnxruntime.
> open-cog : works towards AGI and integrates AI algorithms and systems into humanoid robotic systems. Most of the activity within this particular repo has focused on integrating natural language chat, common-sense reasoning, assorted learning algorithms, and motor control of humanoid robots.

		> [prophet](): facebook's prophet is a tool for producing high quality forecasts for time series data that has multiple seasonality with linear or non-linear growth.
		> [Apache SystemDS](): SystemDS is an open source ML system for the end-to-end data science lifecycle from data integration, cleaning, and feature engineering, over efficient, local and distributed ML model training, to deployment and serving.
		> [AIF360](): A comprehensive set of fairness metrics for datasets and machine learning models, explanations for these metrics, and algorithms to mitigate bias in datasets and models.
		> [tpot](): A Python Automated Machine Learning tool that optimizes machine learning pipelines using genetic programming or a data science assistant for pipeline generation.
		> [feature-tool](): Feature tools automatically create features from temporal and relational datasets.
		> [auto-sklearn](): is an automated machine learning toolkit and a drop-in replacement for a scikit-learn estimator.
		> [skorch](): A scikit-learn compatible neural network library that wraps PyTorch.
		> [streamlit](): The fastest way to build data apps in Python
		also this repo [awesome-ml]() covers a wide range of topics.
		> [optuna](): Optuna is an automatic hyperparameter optimization software framework, particularly designed for machine learning.
		> [shap](): A game theoretic approach to explain the output of any machine learning model.
		> [pandas-profiling](): Create HTML profiling reports from pandas DataFrame objects

Open Source Python Libraries

Github [repo search readme](#) ---> [Github](#).

Here is a list of all python libraries beyond 2k stars, updated in 25/09/2022

PYTHON LIBRARIES:

Python	+ [awesome-python](#), [The Algorithms/Python](#), [awesome-ml/python](#), [ctci](#).
	+ [python pattern](#), [py-cheatsheet](#), [py-examples](#), [interactive-coding-challenges](#).
	+ [python-robotics](#), [data-structure & algorithm](#), [pysheet](#), [cookiecutter](#).
pylibs	+ [python-fire](#), [faker](#) & [mimesis](#), [sh](#), [marshmallow](#), [boltons](#), [py-github](#), [py-dotenv](#), [jedi](#), [jedi-vim](#), [setup.py](#), [trio](#), [pycodestyle](#), [pyinstrument](#), [pathplanning](#), [pidcat](#), [augly](#) (data aug), [pipreqs](#) (or pip freeze > req.txt), [apscheduler](#) & [huey](#) (task schedule), [attrs](#), [bandit](#), [tablib](#), [autopep8](#), [better_exception](#), [tenacity](#), [py-sorted-containers](#), [viztracer](#), [memray](#), [ryven](#), [black](#), [monkeytype](#), [pytype](#), [vprof](#), [cookie-cutter-py-package](#), [coconut](#) (functional programming), [pampy](#).
essentials libraries	+ [numpy](#), [pandas](#), [matplotlib](#), [scipy](#), [scikit-learn](#) | [blaze](#) (numpy pandas for big data), [cupy](#) (NumPy & SciPy for GPU).
ml extra	+ [transfer learning](#), [docker-stacks](#), [hyper-opt](#), [feature-tools](#), [einops](#), [cog](#), [floydhub](#), [FEAST](#), [causal-ml](#), [scikit-opt](#), [anomaly detect](#), [Bayesian Optimization](#).
TensorFlow	+ [tensorpack](#), [hub](#) (transfer learning).
PyTorch	+ [pyg-team](#), [pretrained-models](#), [minGPT](#), [tensorboardX](#), [pyro](#), [CNNviZ](#), [External Attention](#), [segmentation-models](#), [torchdiffeq](#), [ignite](#), [gpytorch](#), [catalyst](#) (for R&D), [big-graph](#), [VAE](#), [metaseq](#), [THOP](#), [captum](#), [Imaginaire](#), [torch2trt](#), [pytorch.summary()](#), [person-reid](#).

new ML framework:	+ autogluon, jax, sanic, falcon, ludwig, kedro, trax, deepo, ivy, chainer, sktime & merlion (time series), pocketflow, igel (no code), flax.

Computer Vision / Visualization Libraries:

CV Toolbox	+ mmlab, gluon-cv, slowfast, grad-cam.
Object Detection	+ YOLOX, detr, ImageAI, EfficientNet, CenterNet, frigate, nanodet (lightwight), obj-detect-metric, ConvNeXt, YoloV7, ByteTrack, mmtracking.
Text-to-Image	+ [PyTorch]DALL-E, DALLE2, dalle-mini, stable diffusion (lexica.art), Imagen, stable diffusion_webui.
Multilingual OCR &QR	+ Paddle Paddle, EasyOCR, amazing-qr, OCR PDF.
Image Augmentation	+ imgaug, albumentations.
Upscale	+ video2x.
Pose Detection	+ alphapose, mmskeleton, videopose3D, DeepLabCut.
Annotation tool	+ labelme, labelmg, label-studio.
Deep Fakes	+ DeepFaceLive, PaddleGAN, dot (deepfakes offensive toolkit).
Segmentation / Inpainting / Matting	+ PaddleSeg, 3D photo inpainting, video matting, bg-matting-v2, yolact, semantic seg, Super SloMo.
Face Detection	+ face.evoLVe, InsightFace, face-alignment, PRNET, fawkes (privacy preserving), deepface, howdy.
WebML	+ gradio (UI for ML model).
3D data processing & reconstruction	+ Open3D, meshroom, PyTorch3D, mmlab3d, OpenPCDet, OpenSfm, kaolin, ODM, PointNet, 3D-Resnets.
fun plugins	+ avatarify-python, word cloud, pywal, tiler, learning to see in dark, rembg, imagededup (find duplicate images), imutils (image operations), videogrep, NeRF, LEGOFY, discoart, image/analogies.
Big Data visualization	+ visdom (LIVE experiments), redash (from Datalake), great_expectations, folium, visidata, lux (pandas dataframe).
draw architecture	+ diagrams (vis cloud architecture).
self driving	+ openpilot
Restoration	+ Real-ESRGAN
Image-2-3D	+ pifuhd
GANs	+ pix2pixhd, Neural-style, tensorflow-GAN
Extra	+ eht-imaging, efficient-ai-backbone, bandai-namco motion dataset, MONAI

NLP libraries:

NLP toolkit	+ [funNLP](#), [NLP Progress](#), [flair](#), [pytext](#), [allenNLP](#), [nltk](#), [haystack](#), [ParlAI](#).
	+ [fairseq](#), [ERNIE](#), [stanza](#), [speech brain](#), [OpenNRE](#)
audio analysis	+ [PyAudioAnalysis](#), [espnet](#) (end2endspeech processing), [librosa](#)
chatbot	+ [errbot](#), [wav2lip](#) (speech2lip)
text2speech	+ [TTS](#)
time series	+ [darts](#), [kats](#)
conversational AI	+ [NeMO](#), [SpeechRecognition](#)
neural machine translation	+ [OpenNMT-py](#),
voice assistance	+ [sepia](#), [deepvoiceconversation](#) (voice style transfer)
annotation	+ [doccano](#)
CTR	+ [deepCTR](#)
extra	+ [vaderSentiment](#) (sentiment analysis), [gensim](#), [pydub](#), [big list of naughty strings](#), [snips-nlu](#), [english words](#), [vocal-remover](#).

Reinforcement Learning libraries:

+ [baselines](#), [gym](#), [mujoco](#), [tianshou](#), [DRL-PyTorch](#), [dm_control](#), [PARL](#), [ReAgent](#), [tensorforce](#).

MLOPs / Distributed ML libraries:

+ [horovod](#), [Deep Speed](#), [modin](#), [bentoml](#), [apex](#)
+ [dask](#), [colossal-AI](#), [composer](#), [mlflow](#), [lightning](#)
+ [airflow](#), [deap](#) (distributed evolutionary algorithms)
+ [ray](#), [mars](#), [tensorflowonspark](#), [sonnet](#)
+ [celery](#), [pandarallel](#), [polyaxon](#), [hummingbird](#),[nni](#) , [byteps](#), [vaex](#), [clearml](#)
+ [tvm](#), [st2](#), [jina](#) , [accelerate](#)

Essential libraries:

toolbox	+ adversarial robustness toolbox, dramatiq (py background process), amundsen
web crawling / parse	+ scrapy, you-get (media dwnldr), sherlock (social media), wttr.in (weather), newspaper, GHunt (investigate google accounts), hitomi (media dwnldr), trape, instagram-scraper, youtube-dl, pytube, pywhat, gallery-dl, kaggle-api, instaloader, autoscraper, serenata-de-amor (social public administration), yt-spammer-purge (scan & delete scam comments), gerapy, mps youtube, dirsearch (web servers), rebound, lark, rainbowstream (twitter client).
data	+ snorkel, imbalanced-learn, datasette, dagster, data shader, ffhq-dataset, cleanlab
data pipeline / data science	+ kafka-py, prefect 2.0, luigi, dvc, cookiecutter-data-science, metaflow, pipelines, ploomber, orchest, streamlit (ml data app)
databases	+ redis-py, edgedb, stellar (fast db snap), ckan
Streaming & stream processing	+ faust, deep lake, stream alert, smart_open (stream_large files), streamlink (video)
API	+ hug, public apis, eve, connexion, LibreTranslate, gspread (google sheet py API), django-tastypie, toapi, koalas (pandas API on spark), google map api
notification	+ apprise, stream-framework,
csv - excel - json	+ csvkit, xmltodict, xlsx writer, json-schema, orjson
recommenders	+ recommenders, surprise, lightfm
Documentation/ present	+ readthedocs, gitpitch, sphinx, present, jrnl, substack, doitlive
home automation & IOT / terminal	+ awesome-iot, core, kitty, autojump, schedule, arrow ; activitywatch (time), prompt, bup (backup), microk8s, xonsh, homelab, mycroft, dumb-init, googler, buku, pendulum (py-date-time), pathpicker, gcalcli, GAM (cli for google workspace), led-strip, xxh, keyboard, webssh, alive-progress, rich, cheat.sh, click, speedtest-cli, icdiff, storm, invoke, instantbox (get clean linux).
Tracking & monitoring	+ wandb, sentry, watchdog, healthchecks, flower, changedetection.io, bpytop, psutil
networking	+ tornado, magic wormhole, fabric, requests-html, twisted, mininet, kombu (messaging library)
automation	+ playwright, ansible, mechanical soup, flyte, molecule
testing	+ locust (user-load test), hypothesis, buildbot, clusterfuzz, pytest, freezegun,

GUI	+ gooey, kivy, textUI, pyautogui, tkinter-designer, Cura (3d printer), Opyrator (ML to GUI), pywinauto,
search	+ searx, whoogle search, ddgo, searx-ng
pdf	+ pdfminer, borb, pyPDF2, paperless-ng, pdfminer.six
extra	+ fauxpilot, dgl, moviepy, thumbor, alphafold, mvt, graphene, spaceship generator, ffmpeg, pymc, octoprint, awesome-math, nupic, hydra, pyod (outlier detection), angr, devicon, dowhy, OnlineJudge, papermill (jupyter nb), arxiv-sanity-preserve, brython, umap (dimensionality reduction), autosploit, librephotos, transitions, FATE (federated learning), fuckIt.py, leetcode, nameko, waydroid, voila (jupyter – to – webapp), p-e-hacking, DrQA, pylint, cookie-cutter-flask, paperless-ngx, cowrie, openreplay, ulauncher, ffsubsync (sync subs with video), blenderGIS, pyJWT, tribler (torrent), hatch (python project management), spack & pdm (package manager), gluonts, eemaps, light-show, yagmail, donkeycar, mopidy (music server), fail2ban (ban daemon that causes multiple auth error), opendrop (like airdrop), GraphEmbedding, pyodide, dupeguru (find duplicate files), curio (systems), deepchem (deep learning for chemistry), osmnx (py for street network), mongoengine, geopandas, font-tools, crunch (png optimization), markovify, azure-cli, biopython, eyewitness, pyGTA5, archinstall, mailu, games, Flask App Builder, statuspage, pyboy, pymongo, qiling (binary hardware emulation), river (online ml), lektor, PyWebIO, py-slack-sdk, discordbot, touch gestures, qtile, cirq (quantum), fairMOT (AI fairness), dedupe, sync-engine, arjun.
debug	+ icecream , gef, PuDB
robotics	+ robotframework, RPA python
video conf	+ zulip
security	+ bunkerweb (security for web apps), itsdangerous (safely pass data from env2env), sshuttle (poor man's vpn), dispatch, IMSI-catcher, tinycheck, fsociety, harvester, howmparound, ipwndfu, MHdDoS, CrackMapExec, awesome-honeypots, beeswithmachineguns, ctf-wiki, monkey, onionshare, objection, dshell, hacktricks, disable-win-tracking, cryptography, whereami, maltrail, ptf, grr, CTFd, androguard, usbkill, voltron, volatility, knock, miasm, h8mail, TBomb, pydictor, capa, LaZagne, theZoo, spiderfoot, patator, rsactftool, haxor news, securedrop, apkleaks, PRET (printer exploit), caldera, katoolin, routersploit, frida, kube-hunter, wafw00f, skyla, pritunl, flan, autorecon, bettercap, dnstwist, commix, wifijammer, whitelist, faraday.

Visualization & Extra libraries:

[manim](#)	[3b1b videos](#)
[scientific visualization book](#)	[bottles](#)
[dash](#), [ggpy](#)	[Lenia](#)
[cartography](#)	[Pywonderland](#)
[altair](#)	[yellowbrick](#)
[shapely](#)	[orange3](#)
[science plots](#)	
[flask_jsondash](#)	

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