COMPLETE LIST OF DATA SCIENCE LIBRARIES FOR ==> DATA ANALYSIS | STATISTICS | MACHINE LEARNING | NLP | DEEP LEARNING & NEURAL NETWORK | COMPUTER VISION | REINFORCEMENT LEARNING | GENERATIVE AI | LARGE LANGUAGE MODEL | AUTO ENCODER

No.	DATA ANALYSIS	**Data analysts use various libraries and tools to work with data, perform analysis, and create visualizations. Here is a list of popular Python libraries commonly used by data analysts. Selction of libraries depends on your specific needs as per project requirment.**
1	**NumPy**	Numerical computing library for working with arrays and matrices, essential for numerical operations.
2	**Pandas**	Data manipulation library providing data structures like DataFrame for cleaning, transforming, and analyzing data.
3	**Matplotlib**	2D plotting library for creating static, interactive, and animated visualizations.
4	**Seaborn**	Statistical data visualization library built on top of Matplotlib, providing a high-level interface for drawing attractive and informative statistical graphics.
5	**Plotly**	Interactive graphing library for creating interactive plots and dashboards.
6	**Bokeh**	Interactive visualization library that targets modern web browsers for presentation.
7	**SciPy**	Library for scientific and technical computing built on top of NumPy, providing additional functionality.
8	**Statsmodels**	Library for estimating and testing statistical models.
9	**Beautiful Soup**	Library for web scraping and parsing HTML and XML documents.
10	**Folium**	Python wrapper for creating Leaflet.js maps.
11	**Dash**	Framework for building analytical web applications.
12	**SQLAlchemy**	SQL toolkit and Object-Relational Mapping (ORM) library for Python.
13	**Arrow**	Library for working with date and time data efficiently.
14	**Geopandas**	Extends Pandas to enable spatial operations and mapping.
15	**Cufflinks**	Connects Pandas and Plotly for easy plotting of Pandas DataFrames.
16	**Scrapy**	Open-source and collaborative web crawling framework for Python, useful for collecting data for analysis.
17	**Dask**	Parallel computing library for analytics that integrates with Pandas.
18	**Pyjanitor**	Simplifies the cleaning and preprocessing of data in Pandas DataFrames.
19	**xlrd and openpyxl**	Libraries for reading and writing Excel files.
20	**Arrow**	Library for working with dates and times.
21	**Pandas-profiling**	Generates profile reports from a Pandas DataFrame.
22	**Scipy.stats:**	Subpackage of SciPy for statistical functions.

MACHINE LEARNING		**Regression analysis is a fundamental task in statistics and machine learning. Several libraries provide tools for implementing regression models. Here's a list of popular Python libraries for regression analysis:**
23	**Scikit-learn**	Comprehensive library for classical machine learning algorithms, including regression, classification, clustering, and more.
24	**XGBoost**	Efficient and scalable implementation of gradient boosting for classification and regression problems.
25	**LightGBM**	Gradient boosting framework designed for speed and efficiency.
26	**CatBoost**	Gradient boosting library with categorical feature support.
27	**Statsmodels**	Library for estimating and testing statistical models.
NLP		**Natural Language Processing (NLP) libraries provide tools and resources for working with human language data. Here is a list of popular NLP libraries in Python. These libraries cover a broad range of NLP tasks, from basic text processing to advanced natural language understanding and generation. The choice of library depends on your specific needs and the complexity of the NLP tasks you're working on.**
28	**NLTK (Natural Language Toolkit):**	A comprehensive library for working with human language data, including tokenization, stemming, tagging, parsing
29	**Spacy**	An open-source NLP library designed for efficient processing and analysis of textual data. It includes pre-trained models for various languages.
30	**Gensim**	A library for topic modeling and document similarity analysis using word embeddings. It is often used for large-scale semantic analysis.
31	**TextBlob**	A simple library for processing textual data, including common NLP tasks like part-of-speech tagging, noun phrase extraction, and sentiment analysis.
32	**Transformers (Hugging Face):**	A library that provides pre-trained models for a wide range of NLP tasks, such as text generation, translation, and sentiment analysis. It is based on the Transformer architecture.
33	**Stanford NLP**	A suite of NLP tools and libraries developed by the Stanford NLP Group, including tools for part-of-speech tagging, named entity recognition, and dependency parsing.
34	**AllenNLP**	An open-source NLP research library built on top of PyTorch. It provides pre-trained models and tools for various NLP tasks.
35	**Polyglot**	A library for working with multilingual text. It supports tasks like language detection, named entity recognition, and sentiment analysis.
36	**PyTorch-Transformers:**	A library that provides pre-trained models for PyTorch, including models from the Hugging Face Transformers library.

37	**FastText**	A powerful NLP library that focuses on state-of-the-art language modeling, named entity recognition, and part-of-speech tagging.
38	**Rasa NLU**	An open-source NLP library specifically designed for building conversational agents and chatbots.
DEEP LEARNING & NEURAL NETWORK		**Deep learning and neural network libraries provide the foundation for building and training complex neural network models.**
39	**TensorFlow**	Developed by Google, TensorFlow is a widely-used open-source deep learning library that supports the creation and training of neural networks.
40	**PyTorch**	PyTorch is a deep learning library known for its dynamic computational graph, making it popular among researchers and practitioners.
41	**Keras**	Originally a separate library, Keras is now integrated into TensorFlow as its official high-level API. It simplifies the process of building and training neural networks.
42	**Theano**	Although no longer actively developed, Theano was one of the early deep learning libraries that allowed for efficient mathematical operations.
43	**MXNet**	An open-source deep learning framework designed for both efficiency and flexibility. It supports both symbolic and imperative programming.
44	**CNTK (Microsoft Cognitive Toolkit):**	Developed by Microsoft, CNTK is a deep learning framework known for its speed and scalability.
45	**Torch**	Torch is an open-source deep learning framework with a focus on flexibility and speed.
COMPUTER VISION		**Computer vision libraries provide tools and algorithms for image and video processing, object recognition, and other computer vision tasks. Here is a list of popular computer vision libraries in Python:**
46	**OpenCV (Open Source Computer Vision Library):**	A comprehensive library for computer vision tasks, including image and video processing, feature detection, object recognition, and machine learning.
47	**Dlib**	A toolkit for machine learning and computer vision, with a focus on facial recognition, object detection, and image processing.
48	**Scikit-Image:**	Part of the Scikit-learn ecosystem, Scikit-Image provides a collection of algorithms for image processing.
49	**ImageAI**	A library for building custom computer vision models using pre-trained models for image recognition, object detection, and more.
50	**Fastai**	A high-level library built on top of PyTorch that simplifies deep learning tasks, including computer vision.
51	**Imutils**	A collection of convenience functions for OpenCV, including resizing, rotation, and displaying images.
52	**VGG Image Annotator (VIA)**	An open-source image annotation tool that allows users to create, edit, and visualize annotations for computer vision tasks.

53	**PyImageSearch:**	A resource for tutorials and articles on computer vision and image processing using Python and OpenCV.
PRE-TRAINED MODEL		**Pretrained models are pre-trained on large datasets for specific tasks and are often used as a starting point for transfer learning or as feature extractors in various deep learning projects. Here is a list of popular pretrained models across different domains.**
54	**Image Classification Models:**	
	ResNet	Residual Networks with various depths (e.g., ResNet50, ResNet101).
	VGG16 | VGG19	Visual Geometry Group models with 16 and 19 weight layers.
	InceptionV3	Inception model with batch normalization.
	MobileNet	Lightweight models designed for mobile and edge devices.
	DenseNet	Densely connected convolutional networks.
55	**Object Detection Models:**	
	Faster R-CNN	Region-based Convolutional Neural Network.
	YOLO (You Only Look Once)	Real-time object detection models (e.g., YOLOv7, YOLOv8).
	SSD (Single Shot Multibox Detector)	Single-shot multibox detector for object detection.
	EfficientDet	Efficient object detection models.
56	**Semantic Segmentation Models:**	
	U-Net:	Popular architecture for image segmentation.
	DeepLabV3+	Semantic image segmentation with deep learning.
	SegNet	Encoder-decoder architecture for pixel-wise segmentation
	PSPNet (Pyramid Scene Parsing Network)	Hierarchical feature aggregation for scene parsing.
57	**Natural Language Processing (NLP) Models:**	
	BERT (Bidirectional Encoder Representations from Transformers)	Pretrained model for natural language understanding.
	GPT (Generative Pretrained Transformer):	Transformer-based language model.
	RoBERTa	Robustly optimized BERT approach.
	DistilBERT	Distilled version of BERT for faster deployment.
58	**Speech Recognition Models:**	
	DeepSpeech	Open-source automatic speech recognition (ASR) engine by Mozilla.

	WaveNet	Deep generative model for raw audio waveforms.
	ASR Transformer (wav2vec 2.0)	Transformer-based ASR model.
59	**Face Recognition Models:**	
	VGGFace2	Pretrained face recognition model.
	OpenFace	Open-source face recognition implementation.
	FaceNet	Model for face recognition using triplets of images.
REINFORCEMENT LEARNING		**Reinforcement learning libraries provide tools and frameworks for developing and implementing reinforcement learning algorithms.**
60	**OpenAI Gym**	OpenAI Gym is a toolkit for developing and comparing reinforcement learning algorithms. It provides a wide variety of environments for testing and benchmarking.
61	**Stable Baselines**	Stable Baselines is a set of high-quality implementations of reinforcement learning algorithms in Python, built on top of OpenAI Gym.
62	**RLlib (Reinforcement Learning Library):**	RLlib is part of the Ray Project and provides a high-level library for reinforcement learning. It supports both single-agent and multi-agent environments.
63	**TensorForce:**	TensorForce is an open-source library for reinforcement learning with a focus on providing a flexible and modular platform for deep reinforcement learning.
64	**TRFL (Temporal Difference Reinforcement Learning):**	TRFL is a library developed by DeepMind that provides a set of building blocks for designing reinforcement learning algorithms.
65	**Keras-RL:**	Keras-RL is a high-level library built on top of Keras and TensorFlow, providing implementations of various reinforcement learning algorithms.
66	**RLTK (Reinforcement Learning Toolkit):**	RLTK is a set of abstractions and tools for the development, execution, and analysis of reinforcement learning experiments.
GENERATIVE AI		**Generative AI libraries provide tools and models for creating artificial intelligence systems that can generate new content, such as images, text, or music. Here is a list of popular generative AI libraries. These libraries cover a range of generative AI approaches, from text generation to image and audio synthesis.**
67	**PyTorch Generative Models**	PyTorch Generative Models is a collection of generative models implemented in PyTorch, including models like VQ-VAE-2 and GPT.
68	**Hugging Face Transformers:**	Hugging Face Transformers is a library that provides pre-trained models for natural language processing, including powerful language generation models like GPT-2 and GPT-3.
69	**OpenAI GPT (Generative Pretrained Transformer):**	OpenAI's GPT series, including models like GPT-2 and GPT-3, are powerful language models capable of generating coherent and contextually relevant text based on input prompts.

70	**Generative Adversarial Networks (GANs) in PyTorch:**	This repository provides PyTorch implementations of various GAN architectures, allowing users to experiment with and train generative models.
71	**StyleGAN2:**	StyleGAN2 is a generative model designed for high-quality image synthesis. It allows for control over the style and appearance of generated images.
72	**BigGAN**	BigGAN is a large-scale generative model capable of generating high-resolution images. The implementation is available in PyTorch.
73	**Variational Autoencoders (VAEs) in TensorFlow:**	This Keras example provides an implementation of a Variational Autoencoder, a type of generative model that focuses on learning a latent representation of input data.
74	**MUNIT (Multimodal Unsupervised Image-to-Image Translation):**	MUNIT is a framework for unsupervised image-to-image translation. It allows for the generation of images with different styles without paired training data.
75	**WaveGAN:**	WaveGAN is a generative model designed for generating realistic audio waveforms. It has applications in music generation and other audio synthesis tasks.
LARGE LANGUAGE MODEL		**Large Language Models (LLMs) are powerful natural language processing models that are pretrained on vast amounts of text data. These large language models have significantly advanced the field of natural language processing, demonstrating impressive capabilities in tasks such as language understanding, translation, summarization, and question answering.**
76	**GPT-3 (Generative Pretrained Transformer 3):**	Developed by OpenAI, GPT-3 is one of the largest language models, with 175 billion parameters. It is capable of performing a wide range of natural language understanding and generation tasks.
77	**GPT-2 (Generative Pretrained Transformer 2):**	Also developed by OpenAI, GPT-2 was one of the first large language models. It has 1.5 billion parameters and demonstrated the capability to generate coherent and contextually relevant text.
78	**BERT (Bidirectional Encoder Representations from Transformers):**	Developed by Google, BERT is a bidirectional transformer model pretrained on a massive amount of text data. It has been influential in natural language understanding tasks and is widely used in various applications.
79	**T5 (Text-To-Text Transfer Transformer):**	Developed by Google, T5 is a versatile language model that frames all NLP tasks as a text-to-text problem, unifying various tasks under a single framework.
80	**RoBERTa (Robustly optimized BERT approach):**	Developed by Facebook AI Research (FAIR), RoBERTa is an optimized version of BERT that addresses some of its limitations, achieving state-of-the-art performance on several benchmarks.

ADVANCE GENERATIVE AI		**Advanced generative AI models have demonstrated remarkable capabilities in generating high-quality and contextually relevant content across various domains, including images, text, and more. Here are some notable advanced generative AI models. These advanced generative AI models represent the forefront of research in the field, continually pushing the boundaries of what is achievable in terms of realistic content generation and multimodal understanding. Developers and researchers continue to explore new architectures and techniques to enhance the capabilities of generative models further.**
81	**DALL-E**	Developed by OpenAI, DALL-E is a generative model capable of creating images from textual descriptions. It goes beyond traditional generative models by generating diverse and creative visual content based on textual prompts.
82	**CLIP (Contrastive Language–Image Pre-training)**	Also from OpenAI, CLIP is a vision-language model that learns visual concepts from natural language descriptions. It can be used for a range of tasks, including image classification, text-to-image retrieval, and more.
83	**VQ-VAE-2 (Vector Quantized Variational Autoencoder 2):**	Developed by DeepMind, VQ-VAE-2 is a generative model that utilizes vector quantization to represent discrete latent structures. It is particularly effective for generating high-quality images.
84	**GPT-4 (Generative Pretrained Transformer 4):**	If available at the time of your inquiry, GPT-4 could represent the next iteration in the GPT series, with potentially improved capabilities over GPT-3.
85	**AI art (artificial intelligence art)**	AI art is any form of digital art created or enhanced with AI tools.
86	**AI prompt**	An artificial intelligence (AI) prompt is a mode of interaction between a human and a LLM that lets the model generate the intended output. This interaction can be in the form of a question, text, code snippets or examples.
87	**AI prompt engineer**	An artificial intelligence (AI) prompt engineer is an expert in creating text-based prompts or cues that can be interpreted and understood by large language models and generative AI tools.
88	**Amazon Bedrock**	Amazon Bedrock -- also known as AWS Bedrock -- is a machine learning platform used to build generative artificial intelligence (AI) applications on the Amazon Web Services cloud computing platform.
89	**Auto-GPT**	Auto-GPT is an experimental, open source autonomous AI agent based on the GPT-4 language model that autonomously chains together tasks to achieve a big-picture goal set by the user.
90	**Google Gemini**	Google Gemini is a family of multimodal artificial intelligence (AI) large language models that have capabilities in language, audio, code and video understanding.
91	**Google Search Generative Experience**	Google Search Generative Experience (SGE) is a set of search and interface capabilities that integrates generative AI-powered results into Google search engine query responses.
92	**Google Search Labs (GSE)**	GSE is an initiative from Alphabet's Google division to provide new capabilities and experiments for Google Search in a preview format before they become publicly available.

93	**Image-to-image translation**	Image-to-image translation is a generative artificial intelligence (AI) technique that translates a source image into a target image while preserving certain visual properties of the original image.
94	**Inception score**	The inception score (IS) is a mathematical algorithm used to measure or determine the quality of images created by generative AI through a generative adversarial network (GAN). The word "inception" refers to the spark of creativity or initial beginning of a thought or action traditionally experienced by humans.
95	**LangChain**	LangChain is an open source framework that lets software developers working with artificial intelligence (AI) and its machine learning subset combine large language models with other external components to develop LLM-powered applications.
96	**Q-learning**	Q-learning is a machine learning approach that enables a model to iteratively learn and improve over time by taking the correct action.
97	**Reinforcement learning from human feedback (RLHF)**	RLHF is a machine learning approach that combines reinforcement learning techniques, such as rewards and comparisons, with human guidance to train an AI agent.
98	**Retrieval-augmented generation**	Retrieval-augmented generation (RAG) is an artificial intelligence (AI) framework that retrieves data from external sources of knowledge to improve the quality of responses.
99	**LLAMA (Layered Location-Aware Middleware Architecture):**	LLAMA is a middleware architecture designed to support location-based services and applications. It provides a layered approach to managing location-related information in software systems.
AUTENCODERS		**Autoencoders are neural network architectures used for unsupervised learning and dimensionality reduction. They consist of an encoder and a decoder, and their primary task is to learn a compressed, efficient representation of input data. Here's a list of various types of autoencoders. These are just some examples, and researchers continue to explore and develop new variations of autoencoders for different applications and challenges in machine learning and deep learning.**
100	**Vanilla Autoencoder**	Basic architecture with an encoder to compress the input and a decoder to reconstruct it
101	**Sparse Autoencoder**	Introduces sparsity constraints in the hidden layer to learn sparse representations
102	**Denoising Autoencoder**	Trains on corrupted input to learn a more robust and noise-resistant representation.
103	**Variational Autoencoder (VAE)**	Introduces probabilistic components, allowing for the generation of new data samples.
104	**Contractive Autoencoder:**	Adds a penalty term to the loss function to enforce stability in the learned representations.
105	**Stacked Autoencoder**	Comprises multiple layers of encoders and decoders for hierarchical feature learning.
106	**Convolutional Autoencoder:**	Utilizes convolutional layers for handling spatial structures in input data, often used in image-related tasks.
107	**Recurrent Autoencoder:**	Incorporates recurrent layers to capture temporal dependencies in sequential data.
108	**Adversarial Autoencoder (AAE):**	Combines the concepts of autoencoders and generative adversarial networks (GANs)

109	**Variational Recurrent Autoencoder (VRAE):**	Merges the concepts of VAE and recurrent autoencoder for sequential data.
110	**Capsule Autoencoder:**	Uses capsule networks to encode hierarchical relationships among features.
111	**Transformative Autoencoder:**	Incorporates transformations to enhance the generative capabilities of the autoencoder.
112	**Attention Mechanism in Autoencoder:**	Applies attention mechanisms to focus on specific parts of the input during encoding and decoding.
113	**Sparse Variational Autoencoder (SVAE):**	Combines sparsity constraints with variational methods.
114	**Undercomplete and Overcomplete Autoencoder:**	Undercomplete autoencoders have a lower-dimensional hidden layer, while overcomplete autoencoders have a higher-dimensional hidden layer.
115	**CycleGAN and DualGAN:**	Adapts the autoencoder concept for image-to-image translation tasks.
116	**SORA AI**	OpenAI announced a new generative AI system named Sora, which produces short videos from text prompts.