**Libraries used in projects:**

**1. nltk (Natural Language Toolkit)**

* **Purpose**: A suite of libraries and programs for natural language processing (NLP). It supports text processing tasks such as tokenization, classification, stemming, tagging, parsing, and semantic reasoning.

**2. numpy**

* **Purpose**: A powerful library for numerical computing in Python. It provides support for arrays, matrices, and many mathematical functions to perform operations on these data structures.

**3. torch (PyTorch)**

* **Purpose**: An open-source deep learning framework that provides tools for building neural networks, performing tensor operations, and automatic differentiation, commonly used for machine learning and AI applications.

**4. fpdf**

* **Purpose**: A library for generating PDF documents in Python. It allows you to create PDFs programmatically, enabling the addition of text, images, and custom layouts.

**5. PIL (Python Imaging Library) / Pillow**

* **Purpose**: Used for image processing tasks like opening, manipulating, and saving various image formats. It also supports many image operations like resizing, cropping, and filtering.

**6. os**

* **Purpose**: Provides a way of interacting with the operating system, including file and directory manipulation, running system commands, and handling environment variables.

**7. random**

* **Purpose**: Provides functions for generating random numbers, making random selections, and performing random operations, which can be useful for random sampling and simulation.

**8. shutil**

* **Purpose**: Used for high-level file operations such as copying, moving, and removing files and directories.

**9. google.colab**

* **Purpose**: A set of libraries specifically for working with Google Colab environments, enabling integration with Google Drive, file uploads, and other Google resources.

**10. pandas**

* **Purpose**: A data manipulation and analysis library. It provides data structures like DataFrame and Series to efficiently handle large datasets and perform operations like filtering, grouping, merging, and pivoting data.

**11. sklearn (scikit-learn)**

* **Purpose**: A machine learning library that includes a wide range of algorithms for classification, regression, clustering, and dimensionality reduction, along with tools for model evaluation and preprocessing.

**12. pickle**

* **Purpose**: A Python library used for serializing (saving) and deserializing (loading) Python objects, enabling you to save machine learning models, data structures, and other objects for future use.

**13. streamlit**

* **Purpose**: A framework for building interactive web applications with minimal code. It’s used to create data dashboards and deploy machine learning models as web apps with a simple interface.

**14. selenium**

* **Purpose**: A web testing and automation framework that can interact with web browsers. It allows for automating actions like clicking buttons, filling out forms, and scraping data from websites.

**15. requests**

* **Purpose**: A simple and easy-to-use library for making HTTP requests, including GET, POST, PUT, and DELETE methods. It simplifies web scraping, API calls, and other web-related tasks.

**16. time**

* **Purpose**: Provides functions for working with time-related tasks like pausing execution for a certain period, formatting time, and measuring execution time.

**17. cv2 (OpenCV)**

* **Purpose**: A computer vision library that provides tools for image and video processing tasks such as feature extraction, face detection, object tracking, and image transformation.

**18. matplotlib**

* **Purpose**: A plotting library used for creating static, animated, and interactive visualizations in Python. It’s commonly used to generate graphs, charts, and figures.

**19. pywt (PyWavelets)**

* **Purpose**: A library for wavelet transforms, which are used for signal processing, data compression, and feature extraction from time-series and image data.

**20. sklearn.svm (Support Vector Machines)**

* **Purpose**: Part of scikit-learn, it includes tools for building and training Support Vector Machines, which are powerful supervised learning models used for classification and regression tasks.

**21. sklearn.preprocessing (StandardScaler, etc.)**

* **Purpose**: Provides tools for scaling and normalizing data to improve the performance of machine learning algorithms. StandardScaler, for example, standardizes features by removing the mean and scaling to unit variance.

**22. sklearn.model\_selection (train\_test\_split, GridSearchCV)**

* **Purpose**: Contains functions for splitting datasets into training and test sets and for hyperparameter tuning using methods like cross-validation and grid search.

**23. sklearn.pipeline**

* **Purpose**: Helps in assembling several steps that can be cross-validated together into a single pipeline, making the process of building and deploying machine learning models more efficient.

**24. joblib**

* **Purpose**: A library for efficient serialization of Python objects, particularly useful for saving and loading large machine learning models. It’s faster than pickle when dealing with large numpy arrays or objects.

**25. google.oauth2 (Service Account Authentication)**

* **Purpose**: Provides tools for authenticating and authorizing Google Cloud resources using service account credentials.

**26. googleapiclient.discovery**

* **Purpose**: Enables interaction with Google APIs like Google Drive, Sheets, Gmail, etc., by creating a service object for performing API operations.

**27. smtplib**

* **Purpose**: A library for sending emails via the Simple Mail Transfer Protocol (SMTP). It can be used for creating email applications that send messages from Python.

**28. email.mime.multipart**

* **Purpose**: Used to create email messages with multiple parts, such as text and attachments, making it easier to send complex emails.

**29. email.mime.text**

* **Purpose**: A module used to create text-based email content (plain text or HTML).