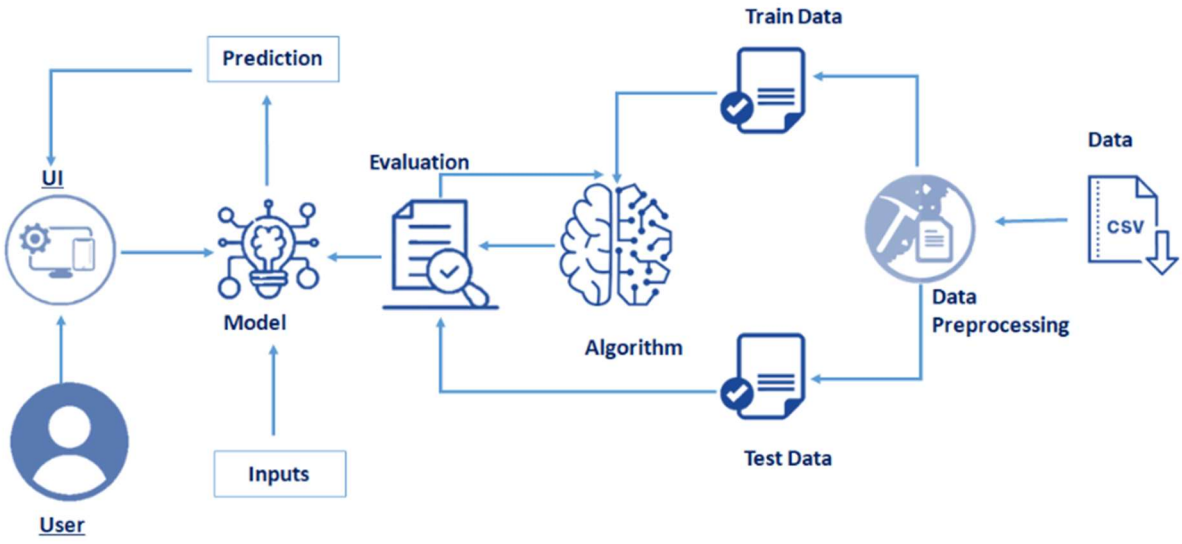
Technology Stack

Date	27 October 2023
Team ID	592862
Project Name	Detect Smoke with The Help of IOT Data And Trigger A Fire Alarm

Technical Architecture:

Technology Architecture is a high-level design that defines the structure, components, and organization of technology systems within an organization or for a specific project. It serves as a blueprint for how various technology elements work together to achieve specific objectives.



- Data collection and preprocessing: This step involves collecting data from relevant sources and cleaning it to ensure that it is in a format that the machine learning algorithm can understand.
- Model training: This step involves feeding the preprocessed data to the machine learning algorithm so that it can learn to identify patterns in the data and make predictions.
- Model evaluation: This step involves evaluating the performance of the trained model on a held-out test set to ensure that it is generalizing well to unseen data.

- Model deployment: This step involves making the trained model available to users so that they can make predictions.

We use above technical flow for developing machine learning model.

Open source Frameworks:

Open source frameworks are software development frameworks that are made available to the public under an open source license. This means that anyone can use, modify, and distribute the framework without paying a license fee.

These are some open source frameworks/libraries/tools that we may use in our project:

1. Flask: Flask application for web integration. Flask is a micro web framework for Python that allows you to create web applications with ease.
2. Pandas: Pandas library for data manipulation and analysis. Pandas is a popular open-source data analysis and manipulation library in Python.
3. Scikit-learn (sklearn): Scikit-learn is used for machine learning tasks in your project. It provides a wide range of machine learning algorithms and tools.
4. Seaborn: Seaborn for data visualization. Seaborn is a Python data visualization library based on Matplotlib that provides a high-level interface for drawing attractive and informative statistical graphics.
5. SMOTE (Synthetic Minority Over-sampling Technique): SMOTE is used to handle imbalanced datasets. It's an open-source technique for generating synthetic samples for the minority class in classification tasks.

Third party API's:

Third-party APIs (Application Programming Interfaces) are sets of rules and protocols that allow one software application to interact with or access the features, data, or functionality of another software or service provided by a third party. In the context of machine learning projects, third-party APIs can be used for various purposes, including data collection, data processing, model deployment, and more.

Here are some examples of third-party APIs:

- Google Maps API: Allows developers to embed maps and directions into their applications.
- Facebook API: Allows developers to integrate Facebook features into their applications, such as login, sharing, and social graph access.
- Twitter API: Allows developers to integrate Twitter features into their applications, such as posting tweets, reading tweets, and following users.
- PayPal API: Allows developers to integrate PayPal payment processing into their applications.
- Stripe API: Allows developers to integrate Stripe payment processing into their applications.

In a machine learning project, you can use these tools for various tasks.

Data Collection: You can use these tools to get data from places like social media or websites. For example, if you're analyzing tweets, you can use Twitter's tools to get the tweets.

Data Processing: Some tools can help you clean or change your data, like making text easier to work with or resizing images.

Model Hosting: You can use some APIs to put your machine learning model on the internet so others can use it. For example, if you built a model to recognize images, you can use an API to share it.

Cloud Services: Some tools allow you to use big computers on the internet. You can use these for training and running your models.

User Access: APIs can help you control who gets to use your machine learning tool. You can use them to make sure only the right people can use it.

Monitoring and Reports: Some tools help you see how well your machine learning tool is doing and generate reports about it.

Model Training: You can use pre-built machine learning models from some tools. This can save you time if you don't want to build a model from scratch.

External Services: You can use APIs to connect other services to your machine learning tool. For example, you can connect a payment system if your tool needs it.

Datasets: Some APIs give you access to collections of data. These datasets can be helpful for training your machine learning models.

Cloud Deployment:

Cloud deployment, also known as cloud hosting or cloud computing, refers to the practice of using remote servers hosted on the internet (the cloud) to store, manage, and process data and applications rather than using local servers or personal computers. It allows organizations and individuals to access and utilize computing resources, including servers, storage, databases, networking, software, analytics, and more, over the internet on a pay-as-you-go basis.

Here's how cloud deployment is typically used and its key benefits:

1. Infrastructure as a Service (IaaS): In cloud deployment, Infrastructure as a Service (IaaS) provides virtualized computing resources over the internet. Users can rent virtual machines, storage, and networking infrastructure as needed, enabling them to scale resources up or down as required.

2. Platform as a Service (PaaS): PaaS offers a cloud-based platform that includes operating systems, development tools, databases, and other services necessary for building and deploying applications. Developers can focus on coding while the cloud provider handles the underlying infrastructure.

3. Software as a Service (SaaS): SaaS delivers software applications over the internet on a subscription basis. Users can access software applications from web browsers without the need for local installations.

Key Benefits of Cloud Deployment:

- **Scalability:** Cloud resources can be easily scaled up or down based on demand. This is particularly valuable for businesses with fluctuating workloads.
- **Cost-Efficiency:** Cloud deployment eliminates the need for capital investments in physical hardware and allows users to pay only for the resources they consume.
- **Flexibility:** Users can access cloud services from virtually anywhere with an internet connection, offering remote access to data and applications.
- **Security:** Reputable cloud providers typically invest in robust security measures and data backup systems to protect user data.

- **Reliability:** Cloud providers often offer high availability and redundancy to ensure that services are accessible and reliable.
- **Automatic Updates:** Cloud providers typically handle software updates and maintenance, reducing the burden on users.

Use Cases of Cloud Deployment:

- **Web Hosting:** Hosting websites and web applications in the cloud for accessibility and scalability.
- **Data Storage:** Storing and managing data in the cloud, including backups and archives.
- **Machine Learning and AI:** Utilizing cloud resources for training machine learning models, AI applications, and data analytics.
- **Business Applications:** Deploying business software, such as customer relationship management (CRM) systems, in the cloud.
- **Internet of Things (IoT):** Managing data generated by IoT devices in the cloud for analysis and control.