**Documentation Of Tasks**

**MAKING OF GOOGLE SHEETS**

Google Sheets is a web-based spreadsheet application developed by Google. It is a part of the Google Drive suite of web applications, along with Google Docs, Slides, and Forms.

Google Sheets is built using several programming languages, including JavaScript, HTML, and CSS. It also uses the Google Apps Script language, a scripting language based on JavaScript, to automate tasks, create custom functions, and integrate with other Google products.

Google Sheets is hosted on Google's servers, which allows users to access their spreadsheets from any device with an internet connection. It also enables multiple users to collaborate on the same spreadsheet simultaneously, with real-time updates and commenting.

Overall, Google Sheets is a powerful and versatile tool that has become a popular alternative to traditional spreadsheet applications like Microsoft Excel.

**EXPLORING GOOGLE COLLAB**

Google Collab (short for Google Colaboratory) is a cloud-based service provided by Google that allows users to create, edit, and share Jupyter notebooks online. Jupyter notebooks are interactive documents that allow users to combine code, text, and data into a single document, making it easier to share and collaborate on data analysis and machine learning projects.

Google Collab provides a free environment where users can run Python code and create Jupyter notebooks without needing to install any software on their local machines. It provides access to pre-installed libraries and frameworks, such as TensorFlow and PyTorch, and can also be used with popular data science tools like pandas, numpy, and matplotlib.

Google Collab is designed to support collaborative work, allowing multiple users to edit the same notebook simultaneously and share it with others via a link. It also allows users to import and export data from a variety of sources, including Google Drive, GitHub, and other cloud services.

Overall, Google Collab is a powerful and convenient tool for data scientists, machine learning engineers, and developers who need to work on data analysis and machine learning projects collaboratively, without the need for a local installation of software.\

**EXPLORING JUPITER NOTEBOOK**

Jupyter Notebook is an interactive computational environment that allows you to create and share documents that contain live code, equations, visualizations, and narrative text. This web application enables you to create and share documents containing live code, equations, visualizations, and narrative text. Jupyter Notebook is widely used in data science and scientific computing for exploring and analyzing data, developing and sharing code, and documenting research. It supports a variety of programming languages, including Python, R, and Julia, and provides a flexible and interactive environment for data analysis, machine learning, and scientific computing.

Jupyter Notebook is part of the larger Jupyter project, which includes other tools such as JupyterLab, a more comprehensive IDE-like interface, and JupyterHub, a multi-user server for Jupyter notebooks. The name "Jupyter" combines the three programming languages it supports: Julia, Python, and R**.**

**AI, ML & DL :**

AI is a broad field that involves making machines smarter, while ML is a subset of AI that involves systems that can self-learn based on algorithms. DL is a type of ML that is applied to large data sets.

AI is an umbrella term that encompasses different subsets, including ML and DL, which involve algorithms that enable machines to learn from data and improve over time. Artificial Intelligence is basically the mechanism to incorporate human intelligence into machines through a set of rules(algorithms)

Machine Learning is a subset of Artificial that involves using algorithms to enable machines to learn from data and improve their performance on specific tasks over time, without being explicitly programmed to do so. In Machine Learning we train the algorithm by providing it with a lot of data and allowing it to learn more about the processed information. Supervised learning uses labeled data to train machine models which means that the output is already known to you. They need external supervision to train models. Unsupervised learning understands the patterns and trends in data and discovers the output. Reinforcement learning is a type of machine learning in which an algorithm learns through trial and error. The algorithm receives feedback in the form of rewards or penalties for each action it takes, and it uses this feedback to learn how to make better decisions in the future.

Deep learning is a subset of machine learning that uses artificial neural networks with multiple layers to enable machines to learn from large amounts of data. These networks are designed to mimic the way the human brain processes information. Deep learning algorithms focus on identifying patterns in the data by using interconnected layers of neurons that are capable of learning from large sets of data. The output of each layer serves as the input to the next layer, allowing the network to learn increasingly complex features and patterns as it progresses through the layers.

**Task: 02**

**CNN**

CNN stands for Convolutional Neural Network. It is a type of neural network commonly used in machine learning and deep learning for image and speech recognition tasks. It is designed to recognize patterns in visual and audio data by processing them through a series of convolutional layers, pooling layers, and fully connected layers. These layers work together to extract and identify features in the data, such as edges and shapes, and ultimately classify the data into specific categories or labels.

CNN consists of three layers: convolutional layer, pooling layer, and fully connected (FC) layer.

The convolutional layer is the first layer while the FC layer is the last. In a CNN the **convolutional layer** is one of the main components. It takes an input, such as an image, and applies a filter or feature detector to it, producing an output known as a feature map. The filter or feature detector is a small matrix that slides over the input, and at each position, it calculates the dot product of the filter and the corresponding input elements. The result of this calculation is a single value in the feature map. The feature map represents different aspects or features of the input, such as edges or textures. Paddingrefers to the addition of extra pixels around the input image when it is processed by the CNN. The number of pixels added can be set to zero or other values. By adding padding, the processing region of the convolutional layer is increased, which allows for a more accurate analysis of the input**.** Stride determines the number of pixels the filter moves across the input matrix. A larger stride value means that the filter moves across the input matrix more quickly, resulting in smaller output.

The pooling layer is an important part of CNN that helps to reduce the number of parameters and computations in the network. Its purpose is to gradually decrease the spatial size of the representation. There are different types of pooling methods, including max-pooling and average pooling.

The fully connected layer in a Convolutional Neural Network (CNN) is the layer where the classification or regression decision is made based on the features learned by the previous layers. It takes the output of the convolutional and pooling layers and flattens it into a 1D vector, which is then passed through a series of fully connected layers where the weights are learned and the output is generated.

**IMAGE PROCESSING**

I learned how we can process images using the OpenCV library in python, After importing the library, mounting google drive, and uploading and reading the image, the following tasks were performed:

* **Rotating an Image**:

The next task completed was rotating an image. This involved using OpenCV to read an image file and then applying a rotation transformation to the image. The rotated image was then saved to a new file.

* **Cropping an Image:**

The next task completed was cropping an image. This involved using OpenCV to read an image file and then applying a cropping transformation to the image. The cropped image was then saved to a new file.

* **Resizing an Image:**

The next task completed was resizing an image. This involved using OpenCV to read an image file and then applying a resizing transformation to the image. The resized image was then saved to a new file.

* **Adjusting Image Contrast:**

The next task completed was adjusting the contrast of an image. This involved using OpenCV to read an image file and then applying a contrast adjustment transformation to the image. The adjusted image was then saved to a new file.

* **Making an Image Blurry:**

The next task completed was making an image blurry. This involved using OpenCV to read an image file and then applying a blur transformation to the image. The blurred image was then saved to a new file.

* **Gaussian Blur:**

The next task completed was applying a Gaussian blur to an image. This involved using OpenCV to read an image file and then applying a Gaussian blur transformation to the image. The blurred image was then saved to a new file.

**Median Blur:**

Another task completed was applying a median blur to an image. This involved using OpenCV to read an image file and then applying a median blur transformation to the image. The blurred image was then saved to a new file.

**Exploring Libraries**

1. **Numpy**

NumPy (short for Numerical Python) is a Python library used for scientific computing. It provides support for large, multi-dimensional arrays and matrices, along with a large collection of mathematical functions to operate on these arrays.

1. **Matplotlib**
2. Matplotlib is a Python library used for creating static, animated, and interactive visualizations in Python. It provides a wide range of visualization tools for creating line plots, scatter plots, bar charts, histograms, and much more. Matplotlib is a powerful library for data visualization and is widely used in data science, engineering, and other scientific fields.
3. **Skit learn**

Scikit-learn, also known as skit learn, is a popular Python library used for machine learning tasks. It provides a range of machine learning algorithms for tasks such as classification, regression, clustering, and dimensionality reduction.

1. **OpenCV**

OpenCV (Open- Source Computer Vision) is a library of programming functions mainly aimed at real-time computer vision. It provides support for image and video processing, object detection and recognition, machine learning, and much more. OpenCV is widely used in fields such as robotics, augmented reality, and self-driving cars.

1. **Pandas**

Pandas is a popular Python library used for data manipulation and analysis. It provides a range of tools for reading and writing data, manipulating data frames, and performing data analysis tasks. Pandas