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AIML | MODULE PROJECT

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5 Takeaways

1. AIML module projects are designed to have a detailed hands on to integrate theoretical knowledge with actual practical implementations.

2. AIML module projects are designed to enable you as a learner to work on realtime industry scenarios, problems and datasets.

3. AIML module projects are designed to enable you simulating the designed solution using AIML techniques onto python technology platform.

4. AIML module projects are designed to be scored using a predefined rubric based system.

5. AIML module projects are designed to enhance your learning above and beyond. Hence, it might require you to experiment, research, self learn and implement.

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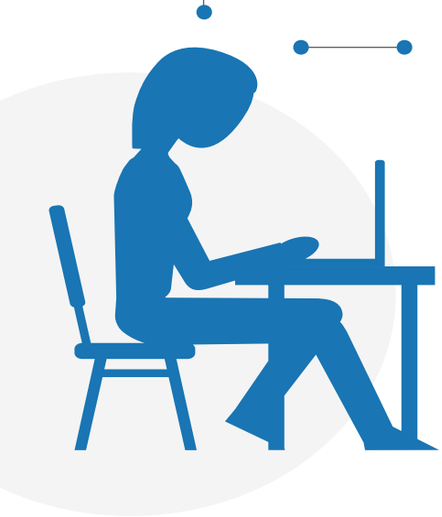
COMPUTER VISION

PART I AIML module project part I consists of task to design a face detection model.

PART II AIML module project part I consists of task to design a face recognition model.



TOTAL SCORE 60

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PART ONE | PROJECT BASED | TOTAL SCORE | 30

- **DOMAIN:** Entertainment
- **CONTEXT:** Company X owns a movie application and repository which caters movie streaming to millions of users who on subscription basis. Company wants to automate the process of cast and crew information in each scene from a movie such that when a user pauses on the movie and clicks on cast information button, the app will show details of the actor in the scene. Company has an in-house computer vision and multimedia experts who need to detect faces from screen shots from the movie scene.
- **DATA DESCRIPTION:** The dataset comprises of images and its mask where there is a human face.
- **PROJECT OBJECTIVE:** Face detection from training images.

Steps and tasks: **[Total Score: 30 points]**

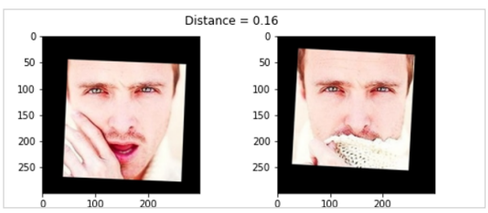
1. Import the dataset.
2. Create features (images) and labels (mask) using that data.
3. Mask detection model:
   - Design a face mask detection model.

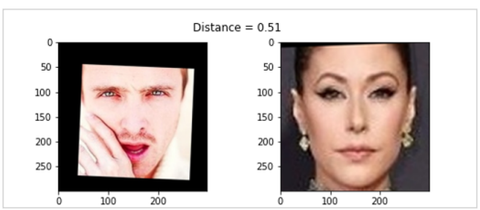
     Hint: Use U-net along with pre-trained transfer learning models
   - Design your own Dice Coefficient and Loss function.
   - Train, tune and test the model.
   - Evaluate the model using testing data.
4. Use the "Prediction image" as an input to your designed model and display the output of the image.

Acknowledgement for the dataset http://mmlab.ie.cuhk.edu.hk/projects/WIDERFace/
Mobile Net paper: https://arxiv.org/pdf/1704.04861.pdf

PART TWO | PROJECT BASED | TOTAL SCORE | 30

- **DOMAIN:** Face recognition
- **CONTEXT:** Company X intends to build a face identification model to recognise human faces.
- **DATA DESCRIPTION:** The dataset comprises of images and its mask where there is a human face.
- **PROJECT OBJECTIVE:** Face Aligned Face Dataset from Pinterest. This dataset contains 10,770 images for 100 people. All images are taken from 'Pinterest' and aligned using dlib library. Some data samples:





- **TASK:** In this problem, we use a pre-trained model trained on Face recognition to recognise similar faces. Here, we are particularly interested in recognising whether two given faces are of the same person or not. Below are the steps involved in the project.
  - Load the dataset and create the metadata.
  - Check some samples of metadata.
  - Load the pre-trained model and weights.
  - Generate Embedding vectors for each face in the dataset.
  - Build distance metrics for identifying the distance between two given images.
  - Use PCA for dimensionality reduction.
  - Build an SVM classifier in order to map each image to its right person.
  - Import the the test image. Display the image. Use the SVM trained model to predict the face.

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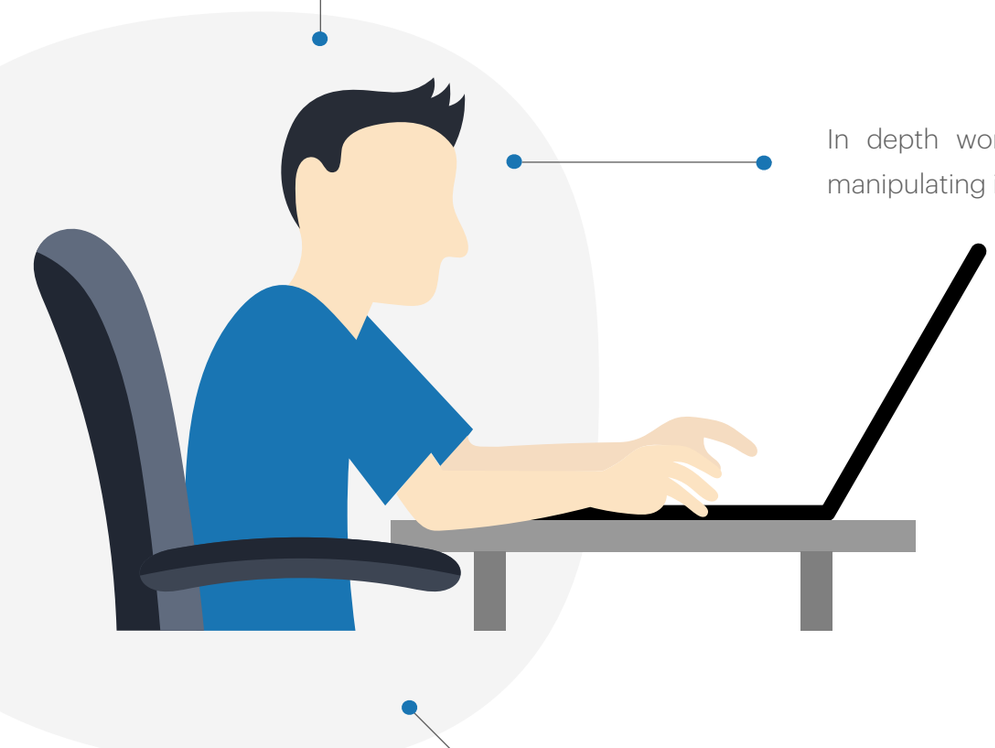
LEARNING OUTCOME

Hands-on working knowledge on using CNN - Convolution neural networks, transferred learning and object detection and localisation for building an image object detector.

Hands-on working knowledge on using siamese networks to identify similarity between two images.



In depth working knowledge on working and manipulating images as a data in python

Training, tuning and testing a complex object detection model.

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" Put yourself in the shoes of an actual "

DATA SCIENTIST

THAT's YOU

Assume that you are working at the company which has received the above problem statement from internal/external client. Finding the best solution for the problem statement will enhance the business/ operations for your organisation/project. You are responsible for the complete delivery. Put your best analytical thinking hat to squeeze the raw data into relevant insights and later into an AIML working model.

PLEASE NOTE

Designing a data driven decision product typically traces the following process:

1. Data and insights:
   Warehouse the relevant data. Clean and validate the data as per the the functional requirements of the problem statement. Capture and validate all possible insights from the data as per the the functional requirements of the problem statement. Please remember there will be numerous ways to achieve this. Sticking to relevance is of utmost importance. Pre-process the data which can be used for relevant AIML model.
2. AIML training:
   Use the data to train and test a relevant AIML model. Tune the model to achieve the best possible learnings out of the data. This is an iterative process where your knowledge on the above data can help to debug and improvise. Different AIML models react differently and perform depending on quality of the data. Baseline your best performing model and store the learnings for future usage.
3. AIML end product:
   Design a trigger or user interface for the business to use the designed AIML model for future usage. Maintain, support and keep the model/ product updated by continuous improvement/training. These are generally triggered by time, business or change in data.

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IMPORTANT POINTERS

Project should be submitted as a single ".html" and ".ipynb" file. Follow the below best practices where your submission should be:

- ".html" and ".ipynb" files should be an exact match.
- Pre-run codes with all outputs intact.
- Error free & machine independent i.e. run on any machine without adding any extra code.
- Well commented for clarity on code designed, assumptions made, approach taken, insights found and results obtained.

Project should be submitted on or before the deadline given by the program office.

Project submission should be an original work from you as a learner. If any percentage of plagiarism found in the submission, the project will not be evaluated and no score will be given.

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HAPPY LEARNING

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