2.1 Question: First, list what diversity you have obtained, and next the ways in which you have obtained the variety (a line for each image).

Diversity in the dataset:

- Multiple images per person (2 images or more)
- Various face orientations and poses
- Images with subject in mirror(Mirror selfies)
- Captured image though transparent mirror
- Variable illumination
- Different resolutions (svga, xga, wxga, HD, Full HD)

01 - Solo image sitting candid
02 - Solo image with complex background
03 - Duo standing with face off camera
04 - Solo sitting same post different person
05 - Different duo sitting
06 - Duo standing with good lighting
07 - Trio Standing with good lighting
08 - Duo talking with face side profile
09 - Trio standing with complex background
10 - Solo sitting with straight face
11 - Solo portrait mode
12 - Dou sitting different angle
13 - Different Duo standing at different pose
14 - Duo standing with face off camera
15 - Trio mirror selfie
16 - Through transparent mirror
17 - Dark lighting conditions
18 - Duo through mirror
19 - Mirror image(Subject and its reflection both visible)
20 - Mirror image different pose(Subject and its reflection both visible)

3.1 Question: Where, if at all, does DeepFace use ideas like these in recognizing faces? Explain briefly.

DeepFace is a deep learning-based facial recognition system developed by Facebook in 2014. It uses convolutional neural networks (CNNs) to extract features from face images and then uses those features to classify the faces. Some of the key ideas used in DeepFace include:
Transfer learning: DeepFace uses a pre-trained CNN on a large dataset to extract features from face images. This pre-trained network was trained on a large dataset of non-face images and was fine-tuned on a smaller dataset of face images.
3D alignment: DeepFace uses a 3D model of a face to align faces in images before they are fed into the CNN. This ensures that faces in images are consistently oriented, making it easier for the network to learn the important features of faces.

Deep neural networks: The facial recognition task is a complex one, and DeepFace uses deep neural networks to capture the non-linear relationships between the pixels in an image and the identity of the face. The deep neural network in DeepFace is trained to identify facial features, such as eyes, nose, mouth, and jawline, and then encode these features into a high-dimensional feature vector. This feature vector is then compared to a database of known faces to determine the closest match. Metric learning is used to optimize the distance metric used in comparing feature vectors, allowing the system to become more accurate at recognizing faces despite variations in lighting, pose, and facial expressions.

Overall, DeepFace uses these and other ideas to improve the accuracy and robustness of facial recognition systems.