Task 1

Question 3

Literature Review

**Review of datasets used in other projects**

* During the literature research, several datasets were investigated, including Labeled Faces in the Wild(LFW), a public dataset, the VGGFace 2 Dataset, and the UCCS dataset, which is private.
* I noticed a distinction between private and public datasets. Some private datasets can be quite helpful for particular studies because they are case-specific and domain-specific. However, some researchers prefer public datasets since the study can be replicated. If they compare data to a study, they can verify the data if the dataset is public; otherwise, gathering such data would be impossible (Hu et al., 2015). When competitions like the International Challenge on Biometric Recognition in the Wild are held, public datasets are used so that the results from each participant can be reproduced. (ICB-RW)

**Review of basic terminology**

* Basic terminology was researched so that a further understanding of the basics of the study are well understood. For instance, it was interesting to find out the relationship between Machine Learning Artificial Neural Networks and Convolutional neural networks.

**Review of different approaches**

* As various researchers worked to improve the accuracy of facial recognition applications, the International Challenge on Biometric Recognition in the Wild (ICBRW) proved to be a valuable resource. Several ways to improve facial recognition accuracy have been attempted, and these approaches could all be studied. For example, Ghaleb et al. won the competition with an accuracy rate of 85.3 per cent in Rank 5 using VGG, an approach using CNN’s. In contrast, Wang et al. attempted to boost accuracy by utilising super-resolution in the same year but only achieved a 59.04 per cent accuracy rate.
* I encountered different research approaches through the ICB-RW competition. Some researchers opt to create different models. For instance, Feifei et al. (2017) developed the Pulse Coupled Neural Network (PCNN), a model based on the synchronised oscillating pulse of a cat's visual brain. Through the competition, I was able to find a substantial amount of research that worked on similar projects that helped me find studies related to my area of research.

**Review of different metrics used in studies**

* The accuracy of face recognition in different types of datasets such as datasets from CCTV cameras and datasets such as the LFW had been altered.
* Distortion types of gaussian blur, box blur, and noise affect accuracy rating in facial recognition applications.

Research Methodology

**Researched the CNN’s that are going to be used**

* The VGG, ResNet50, and Xception were chosen after extensive research regarding various CNNs.
* The VGG and ResNet50 models were selected since they were frequently mentioned in the literature study and would be a suitable way to compare findings in the discussion of results. The Xception model was chosen since it is the most recent version of Google's CNN and to see if it can considerably enhance results in this study and how it compares to studies in the literature review.

**Prototype Research**

* After establishing the prototype structure, research was carried out into how to implement a CNN using code.
* During this research period, YouTube proved to be a valuable resource, as numerous videos demonstrate how CNNs are implemented. This research determines which libraries are the best to utilise based on this type of study and the distinctions between individual libraries, such as complexity and user-friendliness.
* Keras was chosen since it is a powerful library that lets you implement several CNNs with the same code. The Keras library was also picked because it has extensive documentation that is relatively easy to implement, as shown by the numerous examples provided in the documentation.

**Validity**

* The validity and reliability of the data generated by the study were also considered. As Creswell (Research Design 4th edition, 2009) points out, this stage is critical in experimental research since certain safeguards must be in place to ensure that tests are fair. One of the methods used in this study was to train the CNNs many times and then average the results.

Question 4

Evaluation of Prototype

* The effectiveness of the approach using the prototype. The results of when the CNN is trained using a dataset with distortions vs a model that has been trained on a dataset that doesn’t contain any distortions. The accuracy will be considered for both approaches.
* The efficiency of the prototype. The amount of time it takes to train the dataset and produce results for one model while also commenting on the amount of time all of the tests took to complete.

Interpreting Results

* To assess the prototype's accuracy, the first test will be conducted with a dataset that does not contain any distortions, ensuring that the CNN's ground accuracy was accurate. So that it may be compared fairly against datasets that have been distorted. This will be done in order for the study's data to be as accurate as possible.
* The data from the prototype's outcomes will be displayed in diagrams. Each diagram will provide all necessary information, such as the type and amount of distortion added to the dataset. A short paragraph will be placed below so that readers may acquire all of the information they need from that paragraph rather than having to browse through the study to find the relevant diagrams.
* After analysing the results it is important to address whether the hypotheses or questions were supported or whether they were refuted as discussed in Creswell’s book Research Design (4th edition 2019). A conclusion needs to be made on the reason why you think the research was successful or the reason why it was not successful.
* In a study by Aghdam et al. (2019), a similar approach was taken where the images in the gallery(dataset) were down-sampled to attempt to increase the accuracy in images with distortions. It will be a study that will be focused on in the discussion of results to see if an increase was also achieved and by how much the accuracy would have improved over models that were not trained with distortions.

Study Evaluation

* Discuss if the approach taken in the study was successful or unsuccessful and the reason for both. Discuss if there is an approach that could be taken that is more efficient or if you would add anything to your approach to improve the results
* Could there be improvements to the dataset or maybe use a different dataset.
* After analysing the data are there any findings that were of interest that were not initially mentioned in the hypothesis.

Conclusion

* The main findings of the study will be discussed, such findings might include the average accuracy by which a model was improved when trained with a dataset that included one or multiple distortions.
* Mention possible limitations such as not having enough computing power to increase certain parameters for models.
* The shortcomings of the study will be discussed.
* Any future recommendations for the study. One possible recommendation would be to create a model and adjust all the weight to fit your use case rather than using transfer learning.

Introduction

* Research into the basics of face recognition
* Mention the main areas of research that will are going to be studied
* Research information on face recognition in images that are not ideal.

Abstract

* Introduction of the subject being studied
* The main findings discovered in the study

Task 4