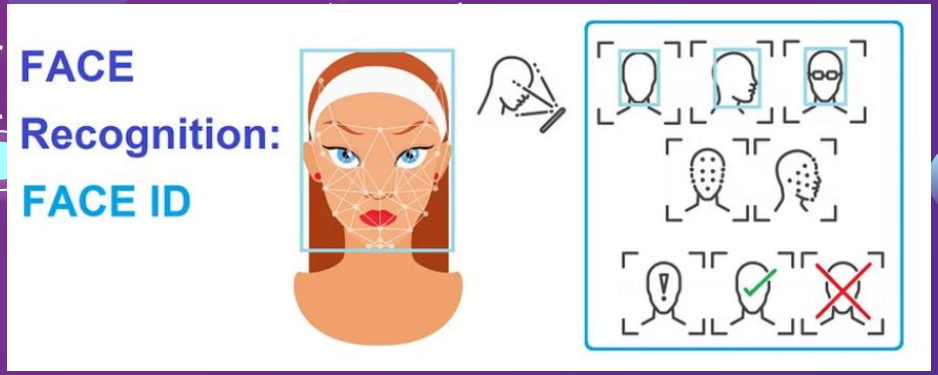

DL Mini-Project :
Face Insight

Group 14
BHAGYA RANA [U19CS012]
AASTHA PATEL [U19CS077]
KRISHNA PATEL [U19CS123]

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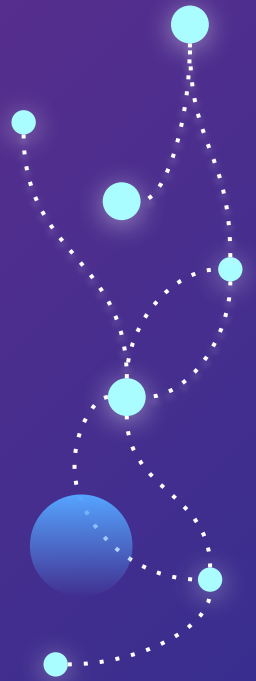
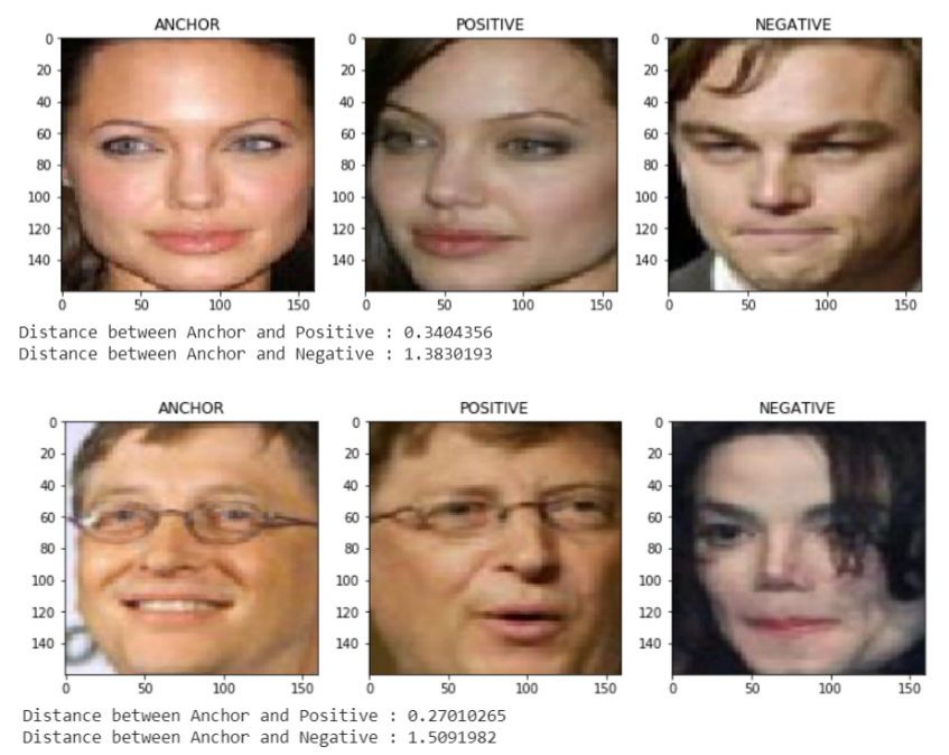


1

Introduction

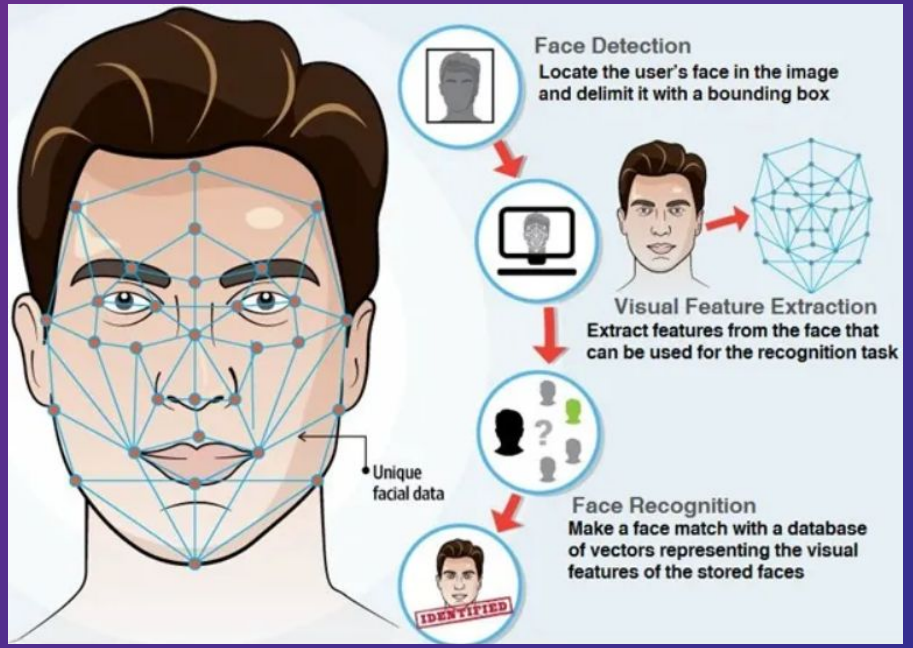
What Problem are we Solving?

Compare two faces and classify whether they are the same or not

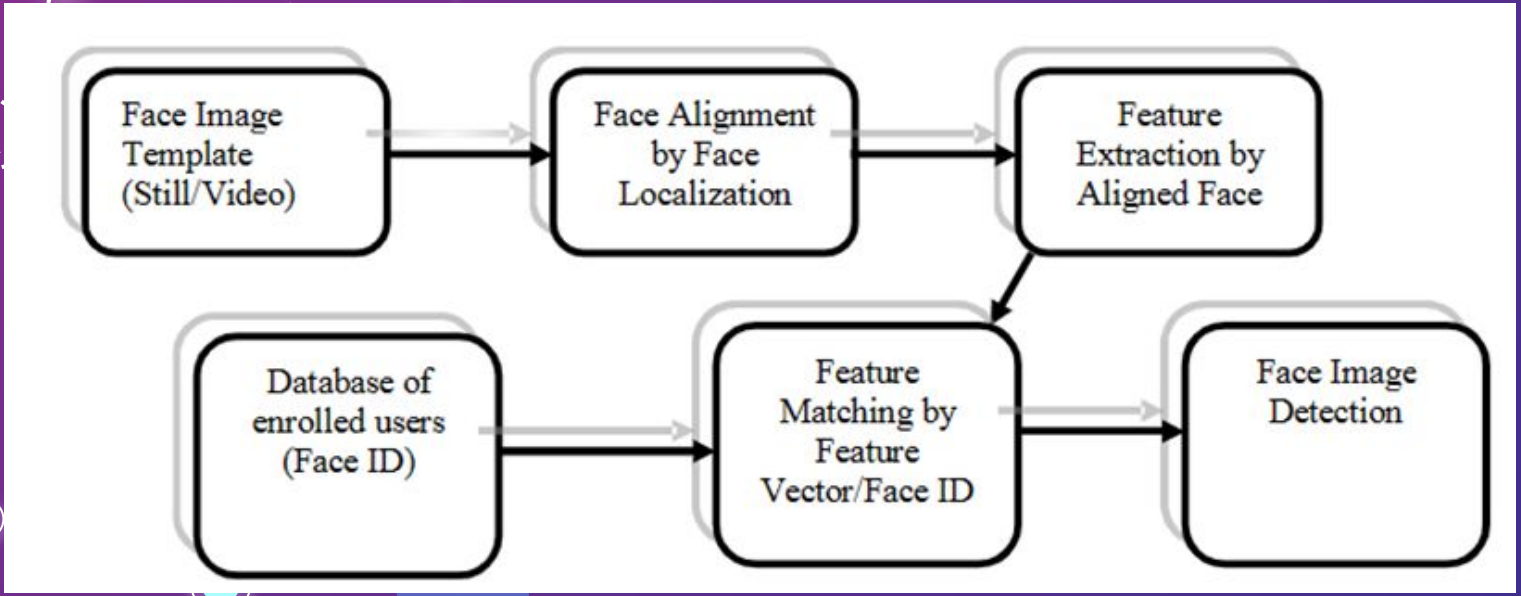


Application?

- Unlocking devices like phones or computers
- Unlocking Doors and Systems
- Validating online transactions (especially the financial ones)
- Authorizing online purchases payments
- Mass Surveillance in airports, Railway, stadium, government offices, and business establishments, or for the whole population like in China (citizen score).



What is Face Detection?



It can identify human faces in images or videos, determine if the face in two images belongs to the same person, or search for a face among a large collection of existing images.

2

Literature Review

Literature Survey

S. N.	Year of Publication	Authors	Title	DataSet Used	Model Applied	PCC	Note
1	1994	A. Pentland, B. Moghaddam, and T. Starner	View-Based and modular eigenspaces for face recognition	The Facial Recognition Technology (FERET)	Eigenfeatures	95%	This method would be less sensitive to appearance changes than standard eigenface method. The DB contained 7,562 images of approximately 3,000 individuals.
2	1996	L. Wiskott and C. von der Malsburg	Recognizing faces by dynamic link matching	The Facial Recognition Technology (FERET)	Graph matching	86.5% and 66.4%	For the matching tests of 111 faces of 15 degree rotation and 110 faces of 30 degree rotation to a gallery of 112 neutral frontal views

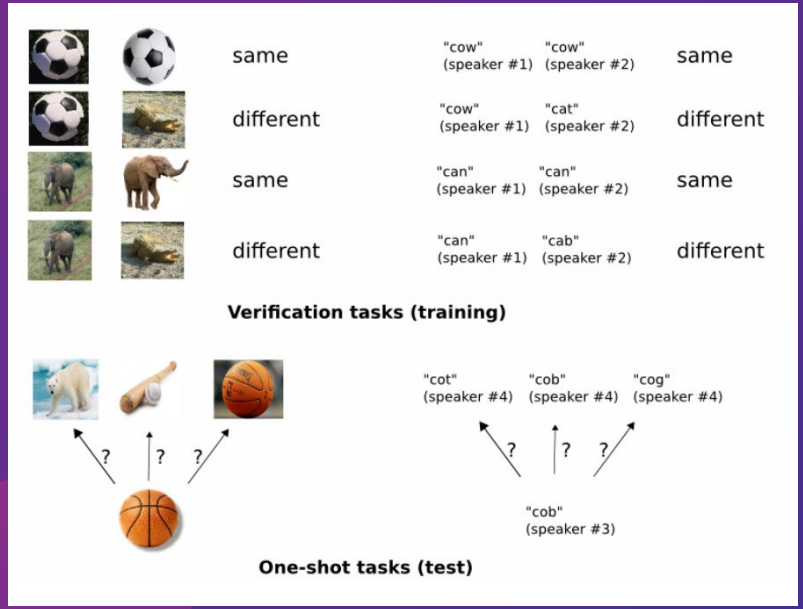
Literature Survey

3	2003	O. Deniz, M. Castrillon, M. Hernandez	Face recognition using independent component analysis and support vector machines	Yale Face Database.	SVM+PCA	99.39 %	DB contained 165 images of 15 individuals. The DB divided into 90 images
4	1997	S.H. Lin, S.Y. Kung, and L.J. Lin	Face recognition/ detection by probabilistic decision-based neural network	ORL Database of Faces	PDBNN	96 %	PDBNN face recognizing up to 200 people in approximately 1 second and the training time is 20 minutes.

Paper: Siamese Neural Networks for One-shot Image Recognition

Labelled Faces in the Wild: LFW Face Database : Main

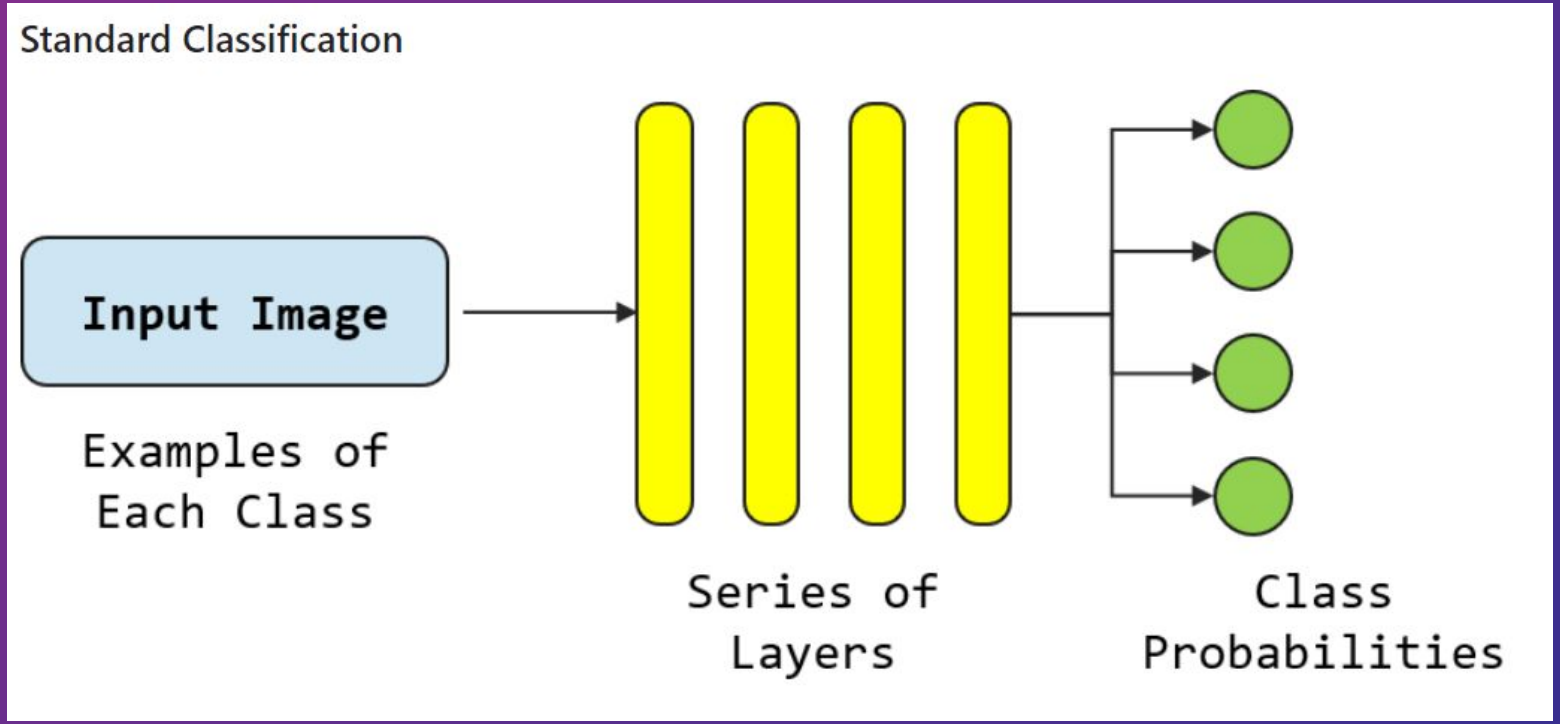
We Tried to Implement the Paper in Google Colab.



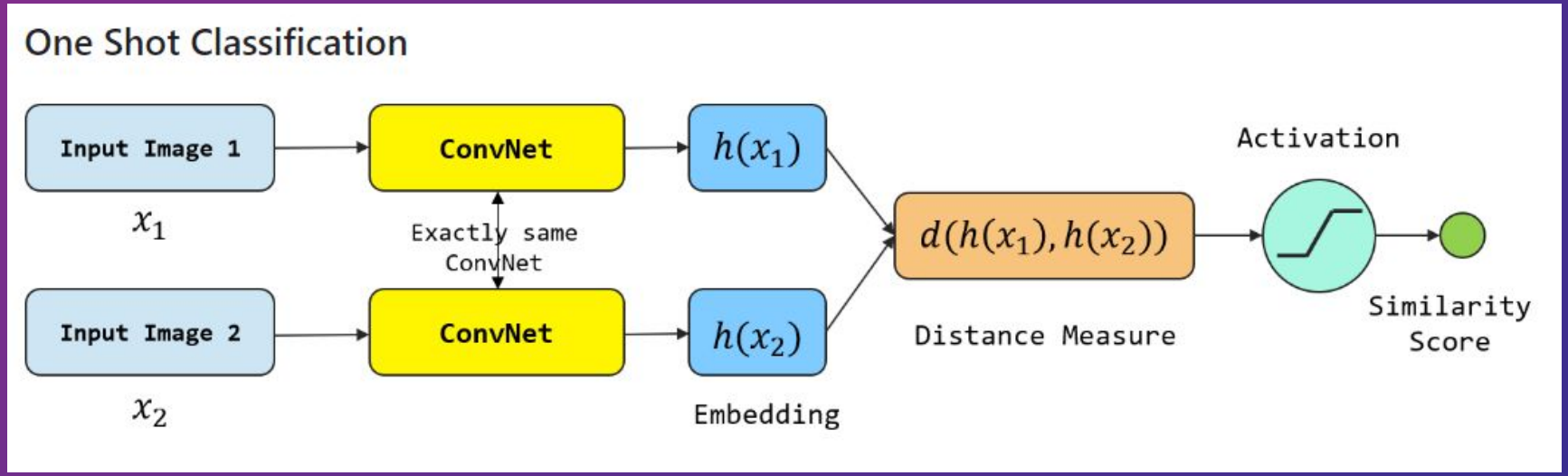
2.1

Motivation

Standard Classification



One Shot Classification



What's wrong with Standard Classification?

- Large number of images of each class required for training.
- Cannot expect to test another class images with the network trained on the specified classes.
- Network must be "re-trained" if class(es) with many images are added.

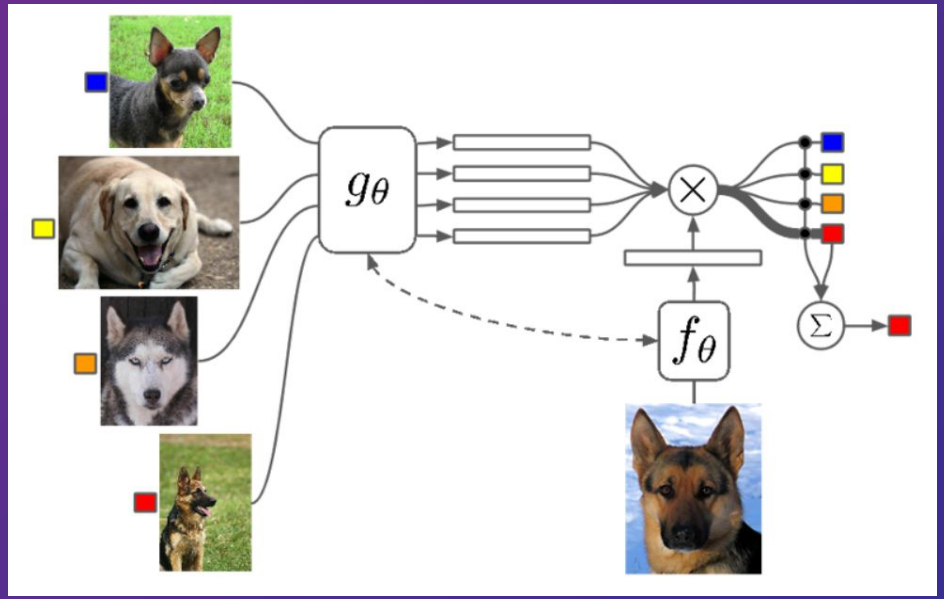
Standard Classification does not fit for the following applications

- When the total number of classes are huge
- When the number of classes is dynamically changing
- When it's difficult to collect the images of a class
- When the cost of data collection and periodical re-training is too high

[Examples] face recognition, signature recognition, item identification in retail, etc.

Siamese Network Comes into Play

- ➔ Our brain doesn't need thousands of pictures of the same object in order to be able to identify it.
- ➔ Only one training example for each class required (That's why the training is called "One Shot".)
- ➔ Siamese networks are a special type of neural network architecture which learns to differentiate between two inputs instead of learns to classify them.

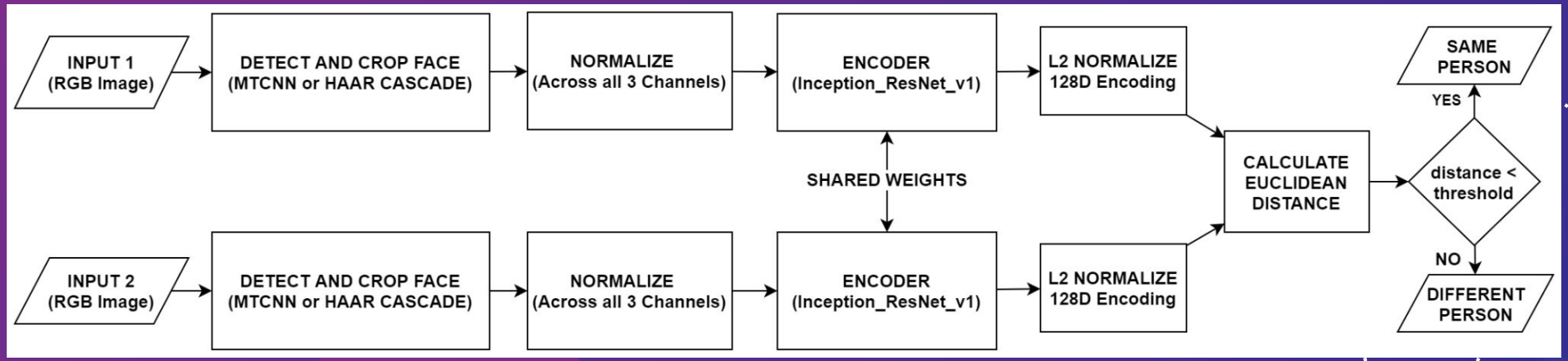


3

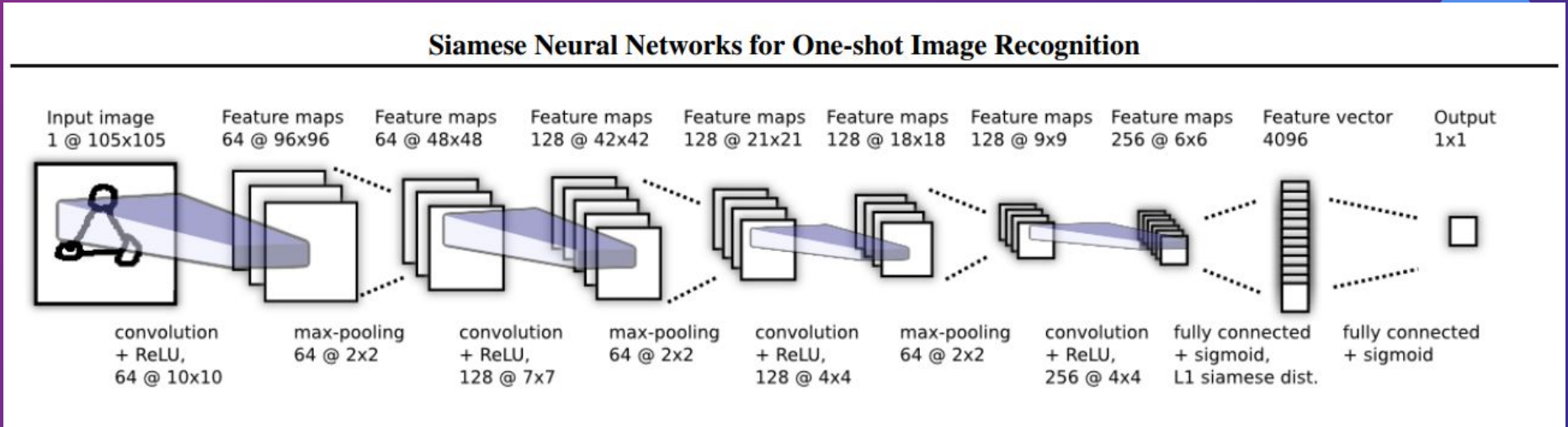
Basic Concept

Siamese Network

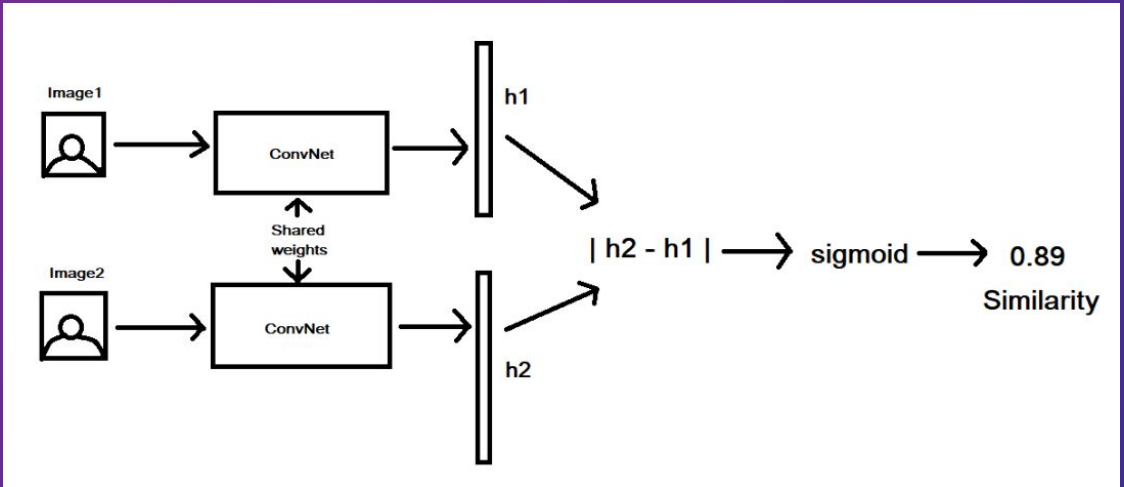
- Siamese networks are a special type of neural network architecture which learns to differentiate between two inputs instead of learns to classify them.



Siamese Network



- Contrastive loss takes the output of the network for a positive example and calculates its distance to an example of the same class and contrasts that with the distance to negative examples.
- When it does a one-shot task, the siamese net simply classifies the test image as whatever image in the support set it thinks is most similar to the test image



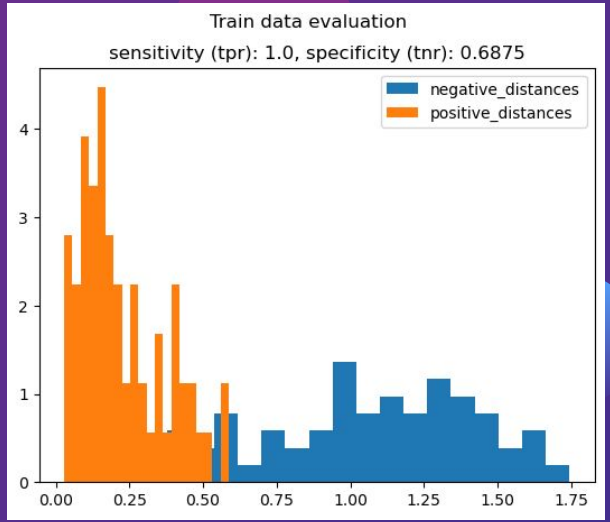
4

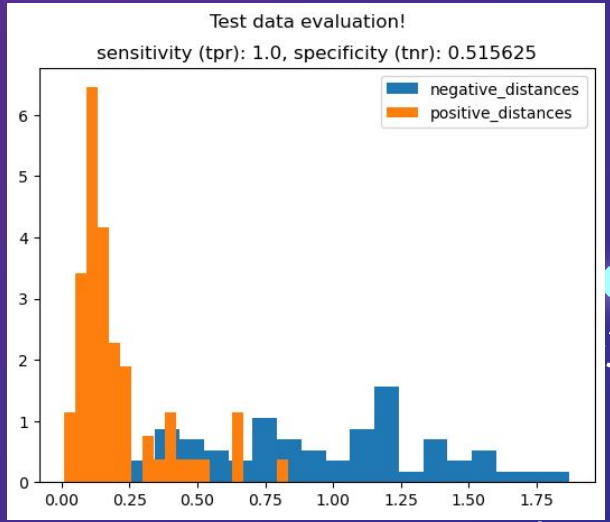
Code Demo

Colab_Code_Link

Results


True label: Match!
Prediction: match with distance: 0.32


Train data evaluation
sensitivity (tpr): 1.0, specificity (tnr): 0.6875
negative_distances
positive_distances
0
1
2
3
4
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75


Test data evaluation!
sensitivity (tpr): 1.0, specificity (tnr): 0.515625
negative_distances
positive_distances
0
1
2
3
4
5
6
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75

THANK YOU

ANY QUESTION?