**Team members:**

Zexuan Li

Kat Pe Benito

**basic\_model:**

**Initial Network：**

**Layer (type) Output Shape Param #**

=================================================================

conv2d (Conv2D) (None, 148, 148, 8) 224

max\_pooling2d (MaxPooling2D (None, 74, 74, 8) 0

)

conv2d\_1 (Conv2D) (None, 72, 72, 16) 1168

max\_pooling2d\_1 (MaxPooling (None, 36, 36, 16) 0

2D)

conv2d\_2 (Conv2D) (None, 34, 34, 32) 4640

flatten (Flatten) (None, 36992) 0

dense (Dense) (None, 64) 2367552

dense\_1 (Dense) (None, 3) 195

=================================================================

**Graph**:



**Best learned model:**

Epoch 8/15

13/13 [==============================] - 4s 253ms/step - loss: 0.4183 - accuracy: 0.8369 - val\_loss: 0.9974 - val\_accuracy: 0.6400

**dropout\_model**

**With Dropout:**

Layer (type) Output Shape Param #

=================================================================

conv2d (Conv2D) (None, 148, 148, 8) 224

max\_pooling2d (MaxPooling2D (None, 74, 74, 8) 0

)

dropout (Dropout) (None, 74, 74, 8) 0

conv2d\_1 (Conv2D) (None, 72, 72, 16) 1168

max\_pooling2d\_1 (MaxPooling (None, 36, 36, 16) 0

2D)

conv2d\_2 (Conv2D) (None, 34, 34, 32) 4640

flatten (Flatten) (None, 36992) 0

dropout\_1 (Dropout) (None, 36992) 0

dense (Dense) (None, 64) 2367552

dense\_1 (Dense) (None, 3) 195

=================================================================

**Graph**:



**Best learned model:**

Epoch 15/15

13/13 [==============================] - 4s 289ms/step - loss: 0.3258 - accuracy: 0.8706 - val\_loss: 2.3864 - val\_accuracy: 0.5325

**merged\_model:**

With data augmentation:

Layer (type) Output Shape Param #

=================================================================

conv2d (Conv2D) (None, 148, 148, 8) 224

max\_pooling2d (MaxPooling2D (None, 74, 74, 8) 0

)

conv2d\_1 (Conv2D) (None, 72, 72, 16) 1168

max\_pooling2d\_1 (MaxPooling (None, 36, 36, 16) 0

2D)

conv2d\_2 (Conv2D) (None, 34, 34, 32) 4640

flatten (Flatten) (None, 36992) 0

dense (Dense) (None, 64) 2367552

dense\_1 (Dense) (None, 3) 195

=================================================================

**Graph**:



**Best learned model:**

Epoch 28/50

13/13 [==============================] - 5s 398ms/step - loss: 0.4547 - accuracy: 0.8256 - val\_loss: 1.0179 - val\_accuracy: 0.6650

**Play Game:**

**Moves:**

**| | | |**

**| | | |**

**| | | |**

**Turn: X**

**Player X took position (1, 0).**

**| | | |**

**|X| | |**

**| | | |**

**Turn: O**

**Player O took position (1, 1).**

**| | | |**

**|X|O| |**

**| | | |**

**Turn: X**

**Player X took position (0, 0).**

**|X| | |**

**|X|O| |**

**| | | |**

**Turn: O**

**Player O took position (2, 1).**

**|X| | |**

**|X|O| |**

**| |O| |**

**Turn: X**

**Player X took position (1, 2).**

**|X| | |**

**|X|O|X|**

**| |O| |**

**Turn: O**

**Player O took position (0, 1).**

**|X|O| |**

**|X|O|X|**

**| |O| |**

**Player O has won!**

* How well did your interface work?

The interface worked well, we found that getting close to the camera alike to the test images rreally helps improve the accuracy.

* Did it recognize your facial expressions with the same accuracy as it achieved against the test set?

Yes.

* If not, why not?