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| 精度算出方法  予測された正解ラベルのデータ数/予測ラベルのデータ数  予測された正解ラベルのデータ数/100(正解ラベルのデータ数) |

３層の構造

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| 1000 |  |  |
| 500 |  |  |
| 100 |  |  |

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|  | 1000 | 500 | 100 |
| 平均再現率 |  |  |  |
| 平均適合率 |  |  |  |

* モデル１

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| 1000 | Model: "model\_2"  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Layer (type) Output Shape Param #  =================================================================  encoder\_input (InputLayer) [(None, 256, 256, 3)] 0  encoder\_conv\_0 (Conv2D) (None, 256, 256, 3) 84  leaky\_re\_lu (LeakyReLU) (None, 256, 256, 3) 0  encoder\_conv\_0\_1 (Conv2D) (None, 128, 128, 16) 448  leaky\_re\_lu\_1 (LeakyReLU) (None, 128, 128, 16) 0  encoder\_conv\_1 (Conv2D) (None, 64, 64, 32) 4640  leaky\_re\_lu\_2 (LeakyReLU) (None, 64, 64, 32) 0  encoder\_conv\_3 (Conv2D) (None, 32, 32, 64) 18496  leaky\_re\_lu\_3 (LeakyReLU) (None, 32, 32, 64) 0  flatten (Flatten) (None, 65536) 0  encoder\_output (Dense) (None, 1000) 65537000  model\_1 (Functional) (None, 256, 256, 3) 65661987  =================================================================  Total params: 131,222,655  Trainable params: 131,222,655  Non-trainable params: 0  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ============  label 0 = 0.23316062176165803  label 0 = 0.45  label 1 = 0.18652849740932642  label 1 = 0.36  label 2 = 0.23834196891191708  label 2 = 0.46  label 3 = 0.34196891191709844  label 3 = 0.66  ============  label 0 = 0.024390243902439025  label 0 = 0.02  label 1 = 0.43902439024390244  label 1 = 0.36  label 2 = 0.524390243902439  label 2 = 0.43  label 3 = 0.012195121951219513  label 3 = 0.01  ============  label 0 = 0.25  label 0 = 0.06  label 1 = 0.4166666666666667  label 1 = 0.1  none  label 3 = 0.3333333333333333  label 3 = 0.08  ============  label 0 = 0.46534653465346537  label 0 = 0.47  label 1 = 0.1782178217821782  label 1 = 0.18  label 2 = 0.10891089108910891  label 2 = 0.11  label 3 = 0.24752475247524752  label 3 = 0.25  ============ |
| 500 | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Layer (type) Output Shape Param #  =================================================================  encoder\_input (InputLayer) [(None, 256, 256, 3)] 0  encoder\_conv\_0 (Conv2D) (None, 256, 256, 3) 84  leaky\_re\_lu (LeakyReLU) (None, 256, 256, 3) 0  encoder\_conv\_0\_1 (Conv2D) (None, 128, 128, 16) 448  leaky\_re\_lu\_1 (LeakyReLU) (None, 128, 128, 16) 0  encoder\_conv\_1 (Conv2D) (None, 64, 64, 32) 4640  leaky\_re\_lu\_2 (LeakyReLU) (None, 64, 64, 32) 0  encoder\_conv\_3 (Conv2D) (None, 32, 32, 64) 18496  leaky\_re\_lu\_3 (LeakyReLU) (None, 32, 32, 64) 0  flatten (Flatten) (None, 65536) 0  encoder\_output (Dense) (None, 500) 32768500  model\_1 (Functional) (None, 256, 256, 3) 32893987  =================================================================  Total params: 65,686,155  Trainable params: 65,686,155  Non-trainable params: 0  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ============  none  label 1 = 0.23809523809523808  label 1 = 0.05  label 2 = 0.7619047619047619  label 2 = 0.16  none  ============  label 0 = 0.028985507246376812  label 0 = 0.02  label 1 = 0.5362318840579711  label 1 = 0.37  label 2 = 0.42028985507246375  label 2 = 0.29  label 3 = 0.014492753623188406  label 3 = 0.01  ============  label 0 = 0.4430379746835443  label 0 = 0.35  label 1 = 0.27848101265822783  label 1 = 0.22  label 2 = 0.08860759493670886  label 2 = 0.07  label 3 = 0.189873417721519  label 3 = 0.15  ============  label 0 = 0.2727272727272727  label 0 = 0.63  label 1 = 0.15584415584415584  label 1 = 0.36  label 2 = 0.2077922077922078  label 2 = 0.48  label 3 = 0.36363636363636365  label 3 = 0.84  ============ |
| 100 | Model: "model\_2"  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Layer (type) Output Shape Param #  =================================================================  encoder\_input (InputLayer) [(None, 256, 256, 3)] 0  encoder\_conv\_0 (Conv2D) (None, 256, 256, 3) 84  leaky\_re\_lu (LeakyReLU) (None, 256, 256, 3) 0  encoder\_conv\_0\_1 (Conv2D) (None, 128, 128, 16) 448  leaky\_re\_lu\_1 (LeakyReLU) (None, 128, 128, 16) 0  encoder\_conv\_1 (Conv2D) (None, 64, 64, 32) 4640  leaky\_re\_lu\_2 (LeakyReLU) (None, 64, 64, 32) 0  encoder\_conv\_3 (Conv2D) (None, 32, 32, 64) 18496  leaky\_re\_lu\_3 (LeakyReLU) (None, 32, 32, 64) 0  flatten (Flatten) (None, 65536) 0  encoder\_output (Dense) (None, 100) 6553700  model\_1 (Functional) (None, 256, 256, 3) 6679587  =================================================================  Total params: 13,256,955  Trainable params: 13,256,955  Non-trainable params: 0  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ============  label 0 = 0.3076923076923077  label 0 = 0.08  label 1 = 0.38461538461538464  label 1 = 0.1  none  label 3 = 0.3076923076923077  label 3 = 0.08  ============  label 0 = 0.024691358024691357  label 0 = 0.02  label 1 = 0.43209876543209874  label 1 = 0.35  label 2 = 0.5308641975308642  label 2 = 0.43  label 3 = 0.012345679012345678  label 3 = 0.01  ============  label 0 = 0.21693121693121692  label 0 = 0.41  label 1 = 0.19576719576719576  label 1 = 0.37  label 2 = 0.23809523809523808  label 2 = 0.45  label 3 = 0.3492063492063492  label 3 = 0.66  ============  label 0 = 0.47115384615384615  label 0 = 0.49  label 1 = 0.17307692307692307  label 1 = 0.18  label 2 = 0.11538461538461539  label 2 = 0.12  label 3 = 0.2403846153846154  label 3 = 0.25  ============ |

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|  | 1000 | 500 | 100 |
| 平均再現率 |  |  |  |
| 平均適合率 |  |  |  |

* モデル２（再実験）

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| 1000 | Model: "model\_2"  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Layer (type) Output Shape Param #  =================================================================  encoder\_input (InputLayer) [(None, 256, 256, 3)] 0  encoder\_conv\_0 (Conv2D) (None, 256, 256, 3) 84  leaky\_re\_lu (LeakyReLU) (None, 256, 256, 3) 0  encoder\_conv\_0\_1 (Conv2D) (None, 128, 128, 16) 448  leaky\_re\_lu\_1 (LeakyReLU) (None, 128, 128, 16) 0  encoder\_conv\_1 (Conv2D) (None, 64, 64, 32) 4640  leaky\_re\_lu\_2 (LeakyReLU) (None, 64, 64, 32) 0  encoder\_conv\_3 (Conv2D) (None, 32, 32, 64) 18496  leaky\_re\_lu\_3 (LeakyReLU) (None, 32, 32, 64) 0  flatten (Flatten) (None, 65536) 0  encoder\_output (Dense) (None, 1000) 65537000  model\_1 (Functional) (None, 256, 256, 3) 65661987  =================================================================  Total params: 131,222,655  Trainable params: 131,222,655  Non-trainable params: 0  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ============  label 0 = 0.4661016949152542  label 0 = 0.55  label 1 = 0.15254237288135594  label 1 = 0.18  label 2 = 0.03389830508474576  label 2 = 0.04  label 3 = 0.3474576271186441  label 3 = 0.41  ============  label 0 = 0.02564102564102564  label 0 = 0.02  label 1 = 0.4358974358974359  label 1 = 0.34  label 2 = 0.5256410256410257  label 2 = 0.41  label 3 = 0.01282051282051282  label 3 = 0.01  ============  label 0 = 0.21739130434782608  label 0 = 0.05  label 1 = 0.43478260869565216  label 1 = 0.1  none  label 3 = 0.34782608695652173  label 3 = 0.08  ============  label 0 = 0.20994475138121546  label 0 = 0.38  label 1 = 0.20994475138121546  label 1 = 0.38  label 2 = 0.30386740331491713  label 2 = 0.55  label 3 = 0.27624309392265195  label 3 = 0.5  ============ |
| 500 | Model: "model\_2"  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Layer (type) Output Shape Param #  =================================================================  encoder\_input (InputLayer) [(None, 256, 256, 3)] 0  encoder\_conv\_0 (Conv2D) (None, 256, 256, 3) 84  leaky\_re\_lu (LeakyReLU) (None, 256, 256, 3) 0  encoder\_conv\_0\_1 (Conv2D) (None, 128, 128, 16) 448  leaky\_re\_lu\_1 (LeakyReLU) (None, 128, 128, 16) 0  encoder\_conv\_1 (Conv2D) (None, 64, 64, 32) 4640  leaky\_re\_lu\_2 (LeakyReLU) (None, 64, 64, 32) 0  encoder\_conv\_3 (Conv2D) (None, 32, 32, 64) 18496  leaky\_re\_lu\_3 (LeakyReLU) (None, 32, 32, 64) 0  flatten (Flatten) (None, 65536) 0  encoder\_output (Dense) (None, 500) 32768500  model\_1 (Functional) (None, 256, 256, 3) 32893987  =================================================================  Total params: 65,686,155  Trainable params: 65,686,155  Non-trainable params: 0  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ============  label 0 = 0.125  label 0 = 0.22  label 1 = 0.25  label 1 = 0.44  label 2 = 0.23295454545454544  label 2 = 0.41  label 3 = 0.39204545454545453  label 3 = 0.69  ============  label 0 = 0.49295774647887325  label 0 = 0.35  label 1 = 0.2112676056338028  label 1 = 0.15  label 2 = 0.056338028169014086  label 2 = 0.04  label 3 = 0.23943661971830985  label 3 = 0.17  ============  label 0 = 0.5394736842105263  label 0 = 0.41  label 1 = 0.039473684210526314  label 1 = 0.03  label 2 = 0.25  label 2 = 0.19  label 3 = 0.17105263157894737  label 3 = 0.13  ============  label 0 = 0.025974025974025976  label 0 = 0.02  label 1 = 0.4935064935064935  label 1 = 0.38  label 2 = 0.4675324675324675  label 2 = 0.36  label 3 = 0.012987012987012988  label 3 = 0.01  ============ |
| 100 | Model: "model\_2"  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Layer (type) Output Shape Param #  =================================================================  encoder\_input (InputLayer) [(None, 256, 256, 3)] 0  encoder\_conv\_0 (Conv2D) (None, 256, 256, 3) 84  leaky\_re\_lu (LeakyReLU) (None, 256, 256, 3) 0  encoder\_conv\_0\_1 (Conv2D) (None, 128, 128, 16) 448  leaky\_re\_lu\_1 (LeakyReLU) (None, 128, 128, 16) 0  encoder\_conv\_1 (Conv2D) (None, 64, 64, 32) 4640  leaky\_re\_lu\_2 (LeakyReLU) (None, 64, 64, 32) 0  encoder\_conv\_3 (Conv2D) (None, 32, 32, 64) 18496  leaky\_re\_lu\_3 (LeakyReLU) (None, 32, 32, 64) 0  flatten (Flatten) (None, 65536) 0  encoder\_output (Dense) (None, 100) 6553700  model\_1 (Functional) (None, 256, 256, 3) 6679587  =================================================================  Total params: 13,256,955  Trainable params: 13,256,955  Non-trainable params: 0  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ============  label 0 = 0.06862745098039216  label 0 = 0.07  label 1 = 0.38235294117647056  label 1 = 0.39  label 2 = 0.37254901960784315  label 2 = 0.38  label 3 = 0.17647058823529413  label 3 = 0.18  ============  label 0 = 0.034482758620689655  label 0 = 0.02  label 1 = 0.46551724137931033  label 1 = 0.27  label 2 = 0.4827586206896552  label 2 = 0.28  label 3 = 0.017241379310344827  label 3 = 0.01  ============  label 0 = 0.5272727272727272  label 0 = 0.29  label 1 = 0.21818181818181817  label 1 = 0.12  none  label 3 = 0.2545454545454545  label 3 = 0.14  ============  label 0 = 0.33513513513513515  label 0 = 0.62  label 1 = 0.11891891891891893  label 1 = 0.22  label 2 = 0.1837837837837838  label 2 = 0.34  label 3 = 0.3621621621621622  label 3 = 0.67  ============ |

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|  | 1000 | 500 | 100 |
| 平均再現率 |  |  |  |
| 平均適合率 |  |  |  |

* モデル３

３層の構造

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| 1000 | Model: "model\_2"  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Layer (type) Output Shape Param #  =================================================================  encoder\_input (InputLayer) [(None, 256, 256, 3)] 0  encoder\_conv\_0 (Conv2D) (None, 256, 256, 3) 84  leaky\_re\_lu (LeakyReLU) (None, 256, 256, 3) 0  encoder\_conv\_0\_1 (Conv2D) (None, 128, 128, 16) 448  leaky\_re\_lu\_1 (LeakyReLU) (None, 128, 128, 16) 0  encoder\_conv\_1 (Conv2D) (None, 64, 64, 32) 4640  leaky\_re\_lu\_2 (LeakyReLU) (None, 64, 64, 32) 0  encoder\_conv\_3 (Conv2D) (None, 32, 32, 64) 18496  leaky\_re\_lu\_3 (LeakyReLU) (None, 32, 32, 64) 0  flatten (Flatten) (None, 65536) 0  encoder\_output (Dense) (None, 1000) 65537000  model\_1 (Functional) (None, 256, 256, 3) 65661987  =================================================================  Total params: 131,222,655  Trainable params: 131,222,655  Non-trainable params: 0  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Model: "embedding\_model"  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Layer (type) Output Shape Param #  =================================================================  input\_1 (InputLayer) [(None, 1000)] 0  dense (Dense) (None, 1000) 1001000  dense\_1 (Dense) (None, 2000) 2002000  dense\_2 (Dense) (None, 1000) 2001000  tf.math.l2\_normalize (TFOpL (None, 1000) 0  ambda)  =================================================================  Total params: 5,004,000  Trainable params: 5,004,000  Non-trainable params: 0  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ============  label 0 = 0.5602836879432624  label 0 = 0.79  label 1 = 0.0851063829787234  label 1 = 0.12  label 2 = 0.11347517730496454  label 2 = 0.16  label 3 = 0.24113475177304963  label 3 = 0.34  ============  label 0 = 0.12121212121212122  label 0 = 0.16  label 1 = 0.4166666666666667  label 1 = 0.55  label 2 = 0.3333333333333333  label 2 = 0.44  label 3 = 0.12878787878787878  label 3 = 0.17  ============  label 0 = 0.060240963855421686  label 0 = 0.05  label 1 = 0.3132530120481928  label 1 = 0.26  label 2 = 0.46987951807228917  label 2 = 0.39  label 3 = 0.1566265060240964  label 3 = 0.13  ============  none  label 1 = 0.1590909090909091  label 1 = 0.07  label 2 = 0.022727272727272728  label 2 = 0.01  label 3 = 0.8181818181818182  label 3 = 0.36  ============ |
| 500 | Model: "model\_2"  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Layer (type) Output Shape Param #  =================================================================  encoder\_input (InputLayer) [(None, 256, 256, 3)] 0  encoder\_conv\_0 (Conv2D) (None, 256, 256, 3) 84  leaky\_re\_lu (LeakyReLU) (None, 256, 256, 3) 0  encoder\_conv\_0\_1 (Conv2D) (None, 128, 128, 16) 448  leaky\_re\_lu\_1 (LeakyReLU) (None, 128, 128, 16) 0  encoder\_conv\_1 (Conv2D) (None, 64, 64, 32) 4640  leaky\_re\_lu\_2 (LeakyReLU) (None, 64, 64, 32) 0  encoder\_conv\_3 (Conv2D) (None, 32, 32, 64) 18496  leaky\_re\_lu\_3 (LeakyReLU) (None, 32, 32, 64) 0  flatten (Flatten) (None, 65536) 0  encoder\_output (Dense) (None, 500) 32768500  model\_1 (Functional) (None, 256, 256, 3) 32893987  =================================================================  Total params: 65,686,155  Trainable params: 65,686,155  Non-trainable params: 0  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Model: "embedding\_model"  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Layer (type) Output Shape Param #  =================================================================  input\_1 (InputLayer) [(None, 500)] 0  dense (Dense) (None, 1000) 501000  dense\_1 (Dense) (None, 2000) 2002000  dense\_2 (Dense) (None, 1000) 2001000  tf.math.l2\_normalize (TFOpL (None, 1000) 0  ambda)  =================================================================  Total params: 4,504,000  Trainable params: 4,504,000  Non-trainable params: 0  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ============  label 0 = 0.5866666666666667  label 0 = 0.88  label 1 = 0.1  label 1 = 0.15  label 2 = 0.12666666666666668  label 2 = 0.19  label 3 = 0.18666666666666668  label 3 = 0.28  ============  label 0 = 0.043478260869565216  label 0 = 0.04  label 1 = 0.2391304347826087  label 1 = 0.22  label 2 = 0.4891304347826087  label 2 = 0.45  label 3 = 0.22826086956521738  label 3 = 0.21  ============  label 0 = 0.06930693069306931  label 0 = 0.07  label 1 = 0.49504950495049505  label 1 = 0.5  label 2 = 0.32673267326732675  label 2 = 0.33  label 3 = 0.10891089108910891  label 3 = 0.11  ============  label 0 = 0.017543859649122806  label 0 = 0.01  label 1 = 0.22807017543859648  label 1 = 0.13  label 2 = 0.05263157894736842  label 2 = 0.03  label 3 = 0.7017543859649122  label 3 = 0.4  ============ |
| 100 | Model: "model\_2"  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Layer (type) Output Shape Param #  =================================================================  encoder\_input (InputLayer) [(None, 256, 256, 3)] 0  encoder\_conv\_0 (Conv2D) (None, 256, 256, 3) 84  leaky\_re\_lu (LeakyReLU) (None, 256, 256, 3) 0  encoder\_conv\_0\_1 (Conv2D) (None, 128, 128, 16) 448  leaky\_re\_lu\_1 (LeakyReLU) (None, 128, 128, 16) 0  encoder\_conv\_1 (Conv2D) (None, 64, 64, 32) 4640  leaky\_re\_lu\_2 (LeakyReLU) (None, 64, 64, 32) 0  encoder\_conv\_3 (Conv2D) (None, 32, 32, 64) 18496  leaky\_re\_lu\_3 (LeakyReLU) (None, 32, 32, 64) 0  flatten (Flatten) (None, 65536) 0  encoder\_output (Dense) (None, 100) 6553700  model\_1 (Functional) (None, 256, 256, 3) 6679587  =================================================================  Total params: 13,256,955  Trainable params: 13,256,955  Non-trainable params: 0  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Model: "embedding\_model"  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Layer (type) Output Shape Param #  =================================================================  input\_1 (InputLayer) [(None, 100)] 0  dense (Dense) (None, 1000) 101000  dense\_1 (Dense) (None, 2000) 2002000  dense\_2 (Dense) (None, 1000) 2001000  tf.math.l2\_normalize (TFOpL (None, 1000) 0  ambda)  =================================================================  Total params: 4,104,000  Trainable params: 4,104,000  Non-trainable params: 0  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ============  label 0 = 0.626984126984127  label 0 = 0.79  label 1 = 0.07936507936507936  label 1 = 0.1  label 2 = 0.1111111111111111  label 2 = 0.14  label 3 = 0.18253968253968253  label 3 = 0.23  ============  label 0 = 0.11176470588235295  label 0 = 0.19  label 1 = 0.38235294117647056  label 1 = 0.65  label 2 = 0.3176470588235294  label 2 = 0.54  label 3 = 0.18823529411764706  label 3 = 0.32  ============  label 0 = 0.02702702702702703  label 0 = 0.01  label 1 = 0.08108108108108109  label 1 = 0.03  none  label 3 = 0.8918918918918919  label 3 = 0.33  ============  label 0 = 0.014925373134328358  label 0 = 0.01  label 1 = 0.3283582089552239  label 1 = 0.22  label 2 = 0.47761194029850745  label 2 = 0.32  label 3 = 0.1791044776119403  label 3 = 0.12  ============ |

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|  | 1000 | 500 | 100 |
| 平均再現率 |  |  |  |
| 平均適合率 |  |  |  |

* モデル４

３層の構造

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| inputs2 = layers.Input(shape=(65536))  x2 = layers.Dense(units=1000, activation='relu')(inputs2)  x2 = layers.Dense(units=2000, activation='relu')(x2)  embeddings = layers.Dense(units=1000, activation=None)(x2)  embeddings = tf.nn.l2\_normalize(embeddings, axis=-1) |

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| 1000 | Model: "model\_2"  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Layer (type) Output Shape Param #  =================================================================  encoder\_input (InputLayer) [(None, 256, 256, 3)] 0  encoder\_conv\_0 (Conv2D) (None, 256, 256, 3) 84  leaky\_re\_lu (LeakyReLU) (None, 256, 256, 3) 0  encoder\_conv\_0\_1 (Conv2D) (None, 128, 128, 16) 448  leaky\_re\_lu\_1 (LeakyReLU) (None, 128, 128, 16) 0  encoder\_conv\_1 (Conv2D) (None, 64, 64, 32) 4640  leaky\_re\_lu\_2 (LeakyReLU) (None, 64, 64, 32) 0  encoder\_conv\_3 (Conv2D) (None, 32, 32, 64) 18496  leaky\_re\_lu\_3 (LeakyReLU) (None, 32, 32, 64) 0  flatten (Flatten) (None, 65536) 0  encoder\_output (Dense) (None, 1000) 65537000  model\_1 (Functional) (None, 256, 256, 3) 65661987  =================================================================  Total params: 131,222,655  Trainable params: 131,222,655  Non-trainable params: 0  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Model: "embedding\_model"  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Layer (type) Output Shape Param #  =================================================================  input\_1 (InputLayer) [(None, 65536)] 0  dense (Dense) (None, 1000) 65537000  dense\_1 (Dense) (None, 2000) 2002000  dense\_2 (Dense) (None, 1000) 2001000  tf.math.l2\_normalize (TFOpL (None, 1000) 0  ambda)  =================================================================  Total params: 69,540,000  Trainable params: 69,540,000  Non-trainable params: 0  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ============  label 0 = 0.07954545454545454  label 0 = 0.07  label 1 = 0.06818181818181818  label 1 = 0.06  label 2 = 0.10227272727272728  label 2 = 0.09  label 3 = 0.75  label 3 = 0.66  ============  label 0 = 0.10526315789473684  label 0 = 0.14  label 1 = 0.5037593984962406  label 1 = 0.67  label 2 = 0.3157894736842105  label 2 = 0.42  label 3 = 0.07518796992481203  label 3 = 0.1  ============  label 0 = 0.1095890410958904  label 0 = 0.08  label 1 = 0.2465753424657534  label 1 = 0.18  label 2 = 0.5616438356164384  label 2 = 0.41  label 3 = 0.0821917808219178  label 3 = 0.06  ============  label 0 = 0.6698113207547169  label 0 = 0.71  label 1 = 0.08490566037735849  label 1 = 0.09  label 2 = 0.07547169811320754  label 2 = 0.08  label 3 = 0.16981132075471697  label 3 = 0.18  ============ |
| 500 | Model: "model\_2"  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Layer (type) Output Shape Param #  =================================================================  encoder\_input (InputLayer) [(None, 256, 256, 3)] 0  encoder\_conv\_0 (Conv2D) (None, 256, 256, 3) 84  leaky\_re\_lu (LeakyReLU) (None, 256, 256, 3) 0  encoder\_conv\_0\_1 (Conv2D) (None, 128, 128, 16) 448  leaky\_re\_lu\_1 (LeakyReLU) (None, 128, 128, 16) 0  encoder\_conv\_1 (Conv2D) (None, 64, 64, 32) 4640  leaky\_re\_lu\_2 (LeakyReLU) (None, 64, 64, 32) 0  encoder\_conv\_3 (Conv2D) (None, 32, 32, 64) 18496  leaky\_re\_lu\_3 (LeakyReLU) (None, 32, 32, 64) 0  flatten (Flatten) (None, 65536) 0  encoder\_output (Dense) (None, 500) 32768500  model\_1 (Functional) (None, 256, 256, 3) 32893987  =================================================================  Total params: 65,686,155  Trainable params: 65,686,155  Non-trainable params: 0  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Model: "embedding\_model"  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Layer (type) Output Shape Param #  =================================================================  input\_1 (InputLayer) [(None, 65536)] 0  dense (Dense) (None, 1000) 65537000  dense\_1 (Dense) (None, 2000) 2002000  dense\_2 (Dense) (None, 1000) 2001000  tf.math.l2\_normalize (TFOpL (None, 1000) 0  ambda)  =================================================================  Total params: 69,540,000  Trainable params: 69,540,000  Non-trainable params: 0  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ============  label 0 = 0.07258064516129033  label 0 = 0.09  label 1 = 0.5564516129032258  label 1 = 0.69  label 2 = 0.27419354838709675  label 2 = 0.34  label 3 = 0.0967741935483871  label 3 = 0.12  ============  label 0 = 0.06862745098039216  label 0 = 0.07  label 1 = 0.10784313725490197  label 1 = 0.11  label 2 = 0.08823529411764706  label 2 = 0.09  label 3 = 0.7352941176470589  label 3 = 0.75  ============  label 0 = 0.06329113924050633  label 0 = 0.05  label 1 = 0.1518987341772152  label 1 = 0.12  label 2 = 0.6708860759493671  label 2 = 0.53  label 3 = 0.11392405063291139  label 3 = 0.09  ============  label 0 = 0.8315789473684211  label 0 = 0.79  label 1 = 0.08421052631578947  label 1 = 0.08  label 2 = 0.042105263157894736  label 2 = 0.04  label 3 = 0.042105263157894736  label 3 = 0.04  ============ |
| 100 | Model: "model\_2"  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Layer (type) Output Shape Param #  =================================================================  encoder\_input (InputLayer) [(None, 256, 256, 3)] 0  encoder\_conv\_0 (Conv2D) (None, 256, 256, 3) 84  leaky\_re\_lu (LeakyReLU) (None, 256, 256, 3) 0  encoder\_conv\_0\_1 (Conv2D) (None, 128, 128, 16) 448  leaky\_re\_lu\_1 (LeakyReLU) (None, 128, 128, 16) 0  encoder\_conv\_1 (Conv2D) (None, 64, 64, 32) 4640  leaky\_re\_lu\_2 (LeakyReLU) (None, 64, 64, 32) 0  encoder\_conv\_3 (Conv2D) (None, 32, 32, 64) 18496  leaky\_re\_lu\_3 (LeakyReLU) (None, 32, 32, 64) 0  flatten (Flatten) (None, 65536) 0  encoder\_output (Dense) (None, 100) 6553700  model\_1 (Functional) (None, 256, 256, 3) 6679587  =================================================================  Total params: 13,256,955  Trainable params: 13,256,955  Non-trainable params: 0  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Model: "embedding\_model"  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Layer (type) Output Shape Param #  =================================================================  input\_1 (InputLayer) [(None, 65536)] 0  dense (Dense) (None, 1000) 65537000  dense\_1 (Dense) (None, 2000) 2002000  dense\_2 (Dense) (None, 1000) 2001000  tf.math.l2\_normalize (TFOpL (None, 1000) 0  ambda)  =================================================================  Total params: 69,540,000  Trainable params: 69,540,000  Non-trainable params: 0  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ============  label 0 = 0.7064220183486238  label 0 = 0.77  label 1 = 0.09174311926605505  label 1 = 0.1  label 2 = 0.07339449541284404  label 2 = 0.08  label 3 = 0.12844036697247707  label 3 = 0.14  ============  label 0 = 0.07751937984496124  label 0 = 0.1  label 1 = 0.5271317829457365  label 1 = 0.68  label 2 = 0.27906976744186046  label 2 = 0.36  label 3 = 0.11627906976744186  label 3 = 0.15  ============  label 0 = 0.08247422680412371  label 0 = 0.08  label 1 = 0.10309278350515463  label 1 = 0.1  label 2 = 0.14432989690721648  label 2 = 0.14  label 3 = 0.6701030927835051  label 3 = 0.65  ============  label 0 = 0.07692307692307693  label 0 = 0.05  label 1 = 0.18461538461538463  label 1 = 0.12  label 2 = 0.6461538461538462  label 2 = 0.42  label 3 = 0.09230769230769231  label 3 = 0.06  ============ |

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|  | 1000 | 500 | 100 |
| 平均再現率 |  |  |  |
| 平均適合率 |  |  |  |