Model: "sequential\_11"

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Layer (type) Output Shape Param #

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

dense\_36 (Dense) (None, 10) 210

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

batch\_normalization\_12 (Batc (None, 10) 40

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dense\_37 (Dense) (None, 10) 110 (L2(0.1) L1(0.1)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dropout\_11 (Dropout) (None, 10) 0 **0.10**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dense\_38 (Dense) (None, 3) 33

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

Total params: 393

Trainable params: 373

Non-trainable params: 20

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

------------------

Accuracy: 0.676056

----------------------------------------

| Class: N S P |

| Precision: 1.0 0.088 0.667 |

| Recall: 0.614 1.0 0.919 |

| F1: 0.761 0.161 0.773 |

----------------------------------------

Model: "sequential\_12"

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Layer (type) Output Shape Param #

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

dense\_39 (Dense) (None, 10) 210

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

batch\_normalization\_13 (Batc (None, 10) 40

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dense\_40 (Dense) (None, 10) 110 (L2(0.5) L1(0.01)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dropout\_12 (Dropout) (None, 10) 0

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dense\_41 (Dense) (None, 3) 33

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

Total params: 393

Trainable params: 373

Non-trainable params: 20

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

------------------

Accuracy: 0.577465

----------------------------------------

| Class: N S P |

| Precision: 1.0 0.057 0.556 |

| Recall: 0.632 1.0 0.27 |

| F1: 0.774 0.109 0.364 |

----------------------------------------

Model: "sequential\_13"

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Layer (type) Output Shape Param #

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

dense\_42 (Dense) (None, 10) 210

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

batch\_normalization\_14 (Batc (None, 10) 40

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dense\_43 (Dense) (None, 5) 55 (L2(0.01) L1(0.01)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dense\_44 (Dense) (None, 5) 30

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dropout\_13 (Dropout) (None, 5) 0

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dense\_45 (Dense) (None, 3) 18

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

Total params: 353

Trainable params: 333

Non-trainable params: 20

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------------------

Accuracy: 0.699531

----------------------------------------

| Class: N S P |

| Precision: 1.0 0.072 1.0 |

| Recall: 0.649 1.0 0.892 |

| F1: 0.787 0.135 0.943 |

----------------------------------------

Model: "sequential\_14"

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Layer (type) Output Shape Param #

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

dense\_46 (Dense) (None, 10) 210

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batch\_normalization\_15 (Batc (None, 10) 40

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dense\_47 (Dense) (None, 10) 110 (L2(0.01))

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dropout\_14 (Dropout) (None, 10) 0

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dense\_48 (Dense) (None, 3) 33

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

Total params: 393

Trainable params: 373

Non-trainable params: 20

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

------------------

Accuracy: 0.694836

----------------------------------------

| Class: N S P |

| Precision: 0.974 0.096 0.681 |

| Recall: 0.649 1.0 0.865 |

| F1: 0.779 0.175 0.762 |

----------------------------------------

Model: "sequential\_16"

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Layer (type) Output Shape Param #

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

dense\_52 (Dense) (None, 10) 210

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batch\_normalization\_17 (Batc (None, 10) 40

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dense\_53 (Dense) (None, 10) 110 **L2 0.01**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dense\_54 (Dense) (None, 5) 55

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dropout\_16 (Dropout) (None, 5) 0 **0.2**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dense\_55 (Dense) (None, 3) 18

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

Total params: 433

Trainable params: 413

Non-trainable params: 20

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------------------

Accuracy: 0.727700

----------------------------------------

| Class: N S P |

| Precision: 1.0 0.088 0.857 |

| Recall: 0.667 1.0 0.973 |

| F1: 0.8 0.161 0.911 |

----------------------------------------

Model: "sequential\_3"

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Layer (type) Output Shape Param #

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

dense\_12 (Dense) (None, 10) 210

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batch\_normalization\_3 (Batch (None, 10) 40

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dense\_13 (Dense) (None, 10) 110 **0.01**

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dense\_14 (Dense) (None, 5) 55

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dropout\_3 (Dropout) (None, 5) 0 **0.2**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dense\_15 (Dense) (None, 3) 18

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

Total params: 433

Trainable params: 413

Non-trainable params: 20

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

------------------

Accuracy: 0.690141

----------------------------------------

| Class: N S P |

| Precision: 1.0 0.119 0.554 |

| Recall: 0.62 1.0 0.973 |

| F1: 0.765 0.213 0.706 |

----------------------------------------

Model: "sequential"

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Layer (type) Output Shape Param #

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

dense (Dense) (None, 10) 210

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

batch\_normalization (BatchNo (None, 10) 40

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dense\_1 (Dense) (None, 10) 110

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dense\_2 (Dense) (None, 5) 55

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dropout (Dropout) (None, 5) 0

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dense\_3 (Dense) (None, 3) 18

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

Total params: 433

Trainable params: 413

Non-trainable params: 20

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

------------------

Accuracy: 0.906103

----------------------------------------

| Class: N S P |

| Precision: 0.924 0.848 0.75 |

| Recall: 0.975 0.667 0.75 |

| F1: 0.949 0.747 0.75 |

----------------------------------------

min\_delta = 0.00001

Patience = 5

Model: "sequential\_1"

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Layer (type) Output Shape Param #

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

dense\_4 (Dense) (None, 20) 420

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

batch\_normalization\_1 (Batch (None, 20) 80

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dense\_5 (Dense) (None, 10) 210

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dense\_6 (Dense) (None, 5) 55

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dropout\_1 (Dropout) (None, 5) 0

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dense\_7 (Dense) (None, 3) 18

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

Total params: 783

Trainable params: 743

Non-trainable params: 40

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Accuracy: 0.953052

----------------------------------------

| Class: N S P |

| Precision: 0.96 0.857 1.0 |

| Recall: 0.988 0.783 0.857 |

| F1: 0.974 0.818 0.923 |

————————————————————

**9**

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Layer (type) Output Shape Param #

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

dense\_57 (Dense) (None, 20) 420

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batch\_normalization\_14 (Batc (None, 20) 80

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dense\_58 (Dense) (None, 10) 210

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dense\_59 (Dense) (None, 5) 55

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dropout\_14 (Dropout) (None, 5) 0

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dense\_60 (Dense) (None, 3) 18

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

Total params: 783

Trainable params: 743

Non-trainable params: 40

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

------------------

Accuracy: 0.901408

----------------------------------------

| Class: N S P |

| Precision: 0.936 0.652 0.889 |

| Recall: 0.97 0.625 0.696 |

| F1: 0.953 0.638 0.78 |

----------------------------------------

**l\_r = 0.0005**

**Rho = 0.9**

**min\_delta = 0.00005**

**Patience = 5**

**10**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Layer (type) Output Shape Param #

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

dense\_61 (Dense) (None, 20) 420

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batch\_normalization\_15 (Batc (None, 20) 80

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dense\_62 (Dense) (None, 10) 210

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dense\_63 (Dense) (None, 10) 110

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dense\_64 (Dense) (None, 5) 55

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dropout\_15 (Dropout) (None, 5) 0

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dense\_65 (Dense) (None, 3) 18

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

Total params: 893

Trainable params: 853

Non-trainable params: 40

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------------------

Accuracy: 0.929577

----------------------------------------

| Class: N S P |

| Precision: 0.947 0.808 0.938 |

| Recall: 0.976 0.7 0.882 |

| F1: 0.961 0.75 0.909 |

----------------------------------------

**11**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Layer (type) Output Shape Param #

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

dense\_72 (Dense) (None, 20) 420

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

batch\_normalization\_17 (Batc (None, 20) 80

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dense\_73 (Dense) (None, 20) 420

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dense\_74 (Dense) (None, 10) 210

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dense\_75 (Dense) (None, 5) 55

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dense\_76 (Dense) (None, 5) 30

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dropout\_17 (Dropout) (None, 5) 0

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dense\_77 (Dense) (None, 3) 18

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

Total params: 1,233

Trainable params: 1,193

Non-trainable params: 40

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Accuracy: 0.924883

----------------------------------------

| Class: N S P |

| Precision: 0.97 0.706 0.917 |

| Recall: 0.964 0.8 0.733 |

| F1: 0.967 0.75 0.815 |

----------------------------------------

**L\_r = 0.0005**

**Patience = 10**

**12**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Layer (type) Output Shape Param #

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

dense\_192 (Dense) (None, 20) 420

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batch\_normalization\_38 (Batc (None, 20) 80

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dense\_193 (Dense) (None, 20) 420

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dense\_194 (Dense) (None, 10) 210

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dense\_195 (Dense) (None, 10) 110

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dropout\_43 (Dropout) (None, 10) 0

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dense\_196 (Dense) (None, 5) 55

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dense\_197 (Dense) (None, 3) 18

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Total params: 1,313

Trainable params: 1,273

Non-trainable params: 40

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Accuracy: 0.920188

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| Class: N S P |

| Precision: 0.964 0.719 0.857 |

| Recall: 0.953 0.742 0.923 |

| F1: 0.958 0.73 0.889 |

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**13**

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Layer (type) Output Shape Param #

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dense\_308 (Dense) (None, 20) 420

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batch\_normalization\_56 (Batc (None, 20) 80

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dense\_309 (Dense) (None, 20) 420

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dense\_310 (Dense) (None, 10) 210

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dense\_311 (Dense) (None, 10) 110

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dropout\_67 (Dropout) (None, 10) 0

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dense\_312 (Dense) (None, 10) 110

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dense\_313 (Dense) (None, 3) 33

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Total params: 1,383

Trainable params: 1,343

Non-trainable params: 40

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Accuracy: 0.920188

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| Class: N S P |

| Precision: 0.951 0.733 0.95 |

| Recall: 0.969 0.733 0.826 |

| F1: 0.96 0.733 0.884 |

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