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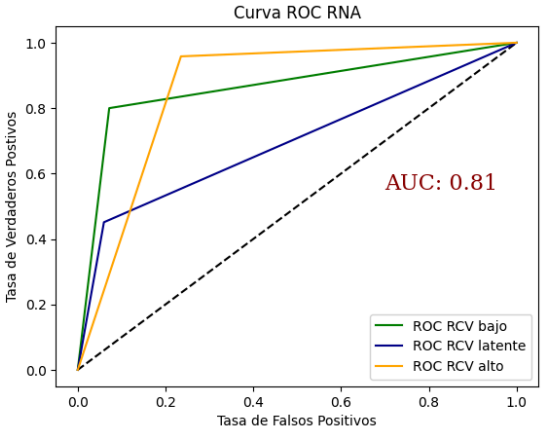
Actividad Clasificación RCV

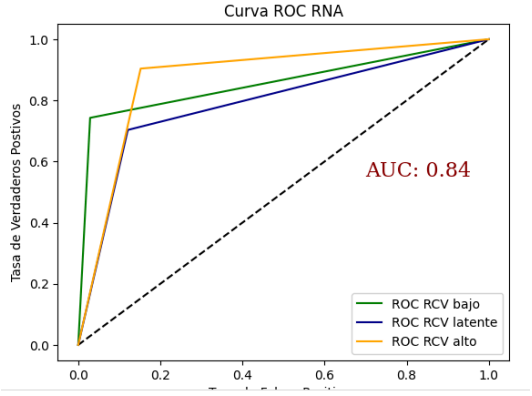
Estado inicial

- **Capa entrada:** 35 neuronas
- **Capa 1 oculta:** 1 neurona
- **Capa salida:** 3 neuronas



Prueba 1

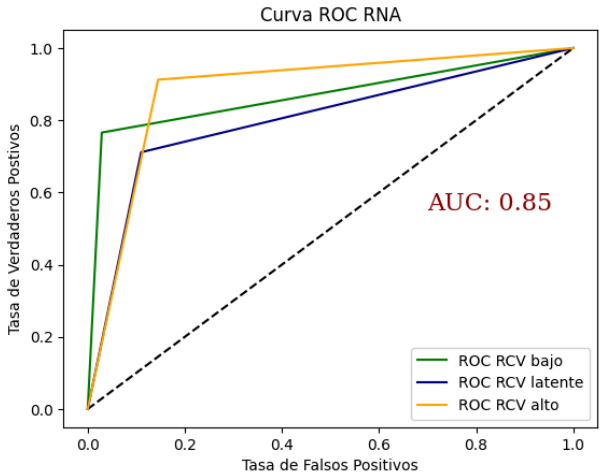
- **Capa entrada:** 35 neuronas
- **Capa 1 oculta:** 5 neurona
- **Capa salida:** 3 neuronas



Prueba 2

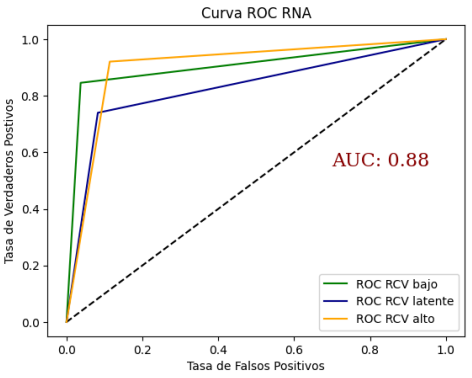
- **Capa entrada:** 35 neuronas
- **Capa 1 oculta:** 10 neuronas
- **Capa 2 oculta:** 10 neuronas

- **Capa salida:** 3 neuronas



Prueba 3

- **Capa de entrada:** 35 neuronas
- **Capa oculta 1:** 10 neuronas
- **Capa oculta 2:** 10 neuronas
- **Capa oculta 3:** 10 neuronas
- **Capa oculta 4:** 10 neuronas
- **Capa oculta 5:** 5 neuronas
- **Capa de salida:** 3 neuronas




```
Epoch 185/200
53/53 [==============================] - 0s 4ms/step - loss: 0.2294 - accuracy: 0.9030 - val_loss: 0.2840 - val_accuracy: 0.8619
Epoch 186/200
53/53 [==============================] - 0s 3ms/step - loss: 0.2291 - accuracy: 0.9054 - val_loss: 0.2878 - val_accuracy: 0.8690
Epoch 187/200
53/53 [==============================] - 0s 3ms/step - loss: 0.2293 - accuracy: 0.9018 - val_loss: 0.2816 - val_accuracy: 0.8667
Epoch 188/200
53/53 [==============================] - 0s 3ms/step - loss: 0.2283 - accuracy: 0.9042 - val_loss: 0.2869 - val_accuracy: 0.8643
Epoch 189/200
53/53 [==============================] - 0s 3ms/step - loss: 0.2286 - accuracy: 0.9018 - val_loss: 0.2834 - val_accuracy: 0.8595
Epoch 190/200
53/53 [==============================] - 0s 4ms/step - loss: 0.2288 - accuracy: 0.9024 - val_loss: 0.2825 - val_accuracy: 0.8619
Epoch 191/200
53/53 [==============================] - 0s 4ms/step - loss: 0.2288 - accuracy: 0.9048 - val_loss: 0.2838 - val_accuracy: 0.8595
Epoch 192/200
53/53 [==============================] - 0s 3ms/step - loss: 0.2285 - accuracy: 0.9065 - val_loss: 0.2863 - val_accuracy: 0.8690
Epoch 193/200
53/53 [==============================] - 0s 3ms/step - loss: 0.2296 - accuracy: 0.9000 - val_loss: 0.2858 - val_accuracy: 0.8667
Epoch 194/200
53/53 [==============================] - 0s 3ms/step - loss: 0.2286 - accuracy: 0.9018 - val_loss: 0.2798 - val_accuracy: 0.8667
Epoch 195/200
53/53 [==============================] - 0s 3ms/step - loss: 0.2298 - accuracy: 0.9030 - val_loss: 0.2801 - val_accuracy: 0.8571
Epoch 196/200
53/53 [==============================] - 0s 4ms/step - loss: 0.2282 - accuracy: 0.9018 - val_loss: 0.2851 - val_accuracy: 0.8619
Epoch 197/200
53/53 [==============================] - 0s 3ms/step - loss: 0.2301 - accuracy: 0.9018 - val_loss: 0.2808 - val_accuracy: 0.8571
Epoch 198/200
53/53 [==============================] - 0s 3ms/step - loss: 0.2282 - accuracy: 0.9060 - val_loss: 0.2802 - val_accuracy: 0.8548
Epoch 199/200
53/53 [==============================] - 0s 3ms/step - loss: 0.2286 - accuracy: 0.9060 - val_loss: 0.2814 - val_accuracy: 0.8571
Epoch 200/200
53/53 [==============================] - 0s 3ms/step - loss: 0.2288 - accuracy: 0.8970 - val_loss: 0.2854 - val_accuracy: 0.8571
```

	precision	recall	f1-score	support
0	0.846	0.846	0.846	175
1	0.771	0.740	0.755	246
2	0.902	0.921	0.911	479
accuracy			0.857	900
macro avg	0.840	0.835	0.837	900
weighted avg	0.855	0.857	0.856	900

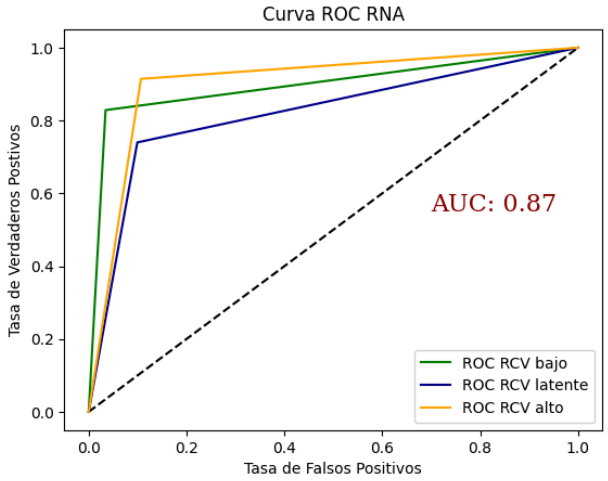
```
El tiempo de cómputo con RNA fue: 43.84 segundos
```

```python
# Definir la arquitectura del modelo de la RNA
modelRNA = models.Sequential()
modelRNA.add(Dense(5, batch_input_shape=(None, 35), activation='relu')) ## neuronas en la capa de entrada (batch_input_shape) y #neuronas en la primera capa oculta
modelRNA.add(Dense(10))
modelRNA.add(Dense(10))
modelRNA.add(Dense(10))
modelRNA.add(Dense(5))
modelRNA.add(Dense(3, activation='softmax'))
```

Prueba 4

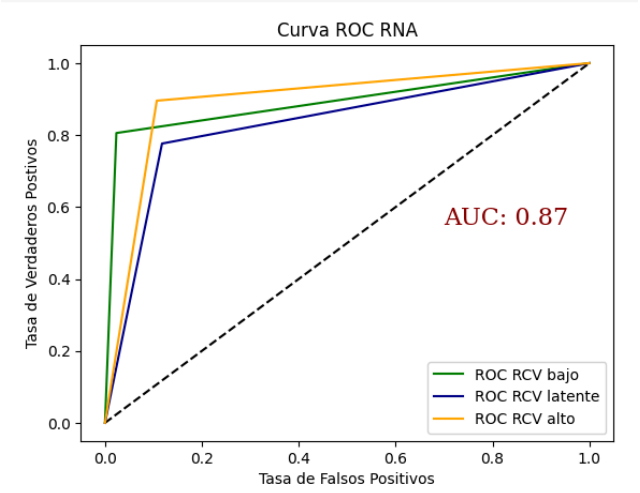
- **Capa entrada:** 35 neuronas
- **Capa 1 oculta:** 10 neuronas
- **Capa 2 oculta:** 5 neuronas

- **Capa salida:**3 neuronas



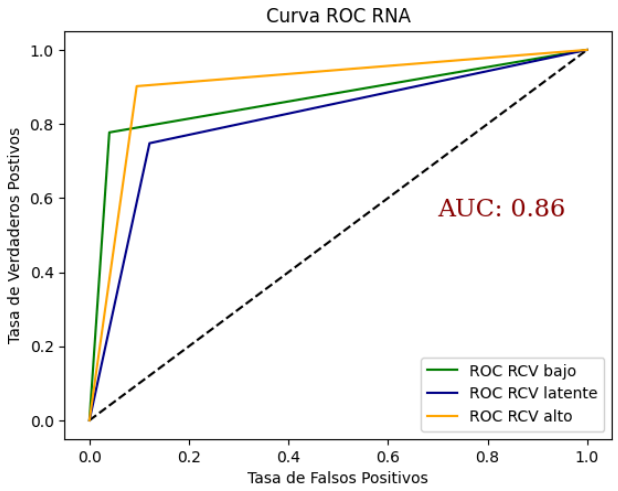
Prueba 5

- **Capa entrada:** 35 neuronas
- **Capa 1 oculta**: 7 neuronas
- **Capa 2 oculta:** 7 neuronas
- **Capa 3 oculta:** 7 neuronas
- **Capa salida:**3 neuronas



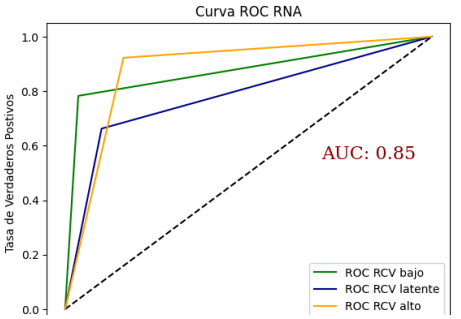
Prueba 6

- **Capa entrada:** 35 neuronas
- **Capa 1 oculta**: 10 neuronas
- **Capa 2 oculta:** 10 neuronas
- **Capa 3 oculta:** 15 neuronas
- **Capa salida:**3 neuronas



Prueba 7

- **Capa de entrada:** 35 neuronas
- **Capa oculta 1:** 10 neuronas
- **Capa oculta 2:** 10 neuronas
- **Capa oculta 3:** 50 neuronas
- **Capa de salida:** 3 neuronas




```
Epoch 187/200
53/53 [==============================] - 0s 6ms/step - loss: 0.1824 - accuracy: 0.9119 - val_loss: 0.3795 - val_accuracy: 0.8190
Epoch 188/200
53/53 [==============================] - 0s 5ms/step - loss: 0.1828 - accuracy: 0.9095 - val_loss: 0.3790 - val_accuracy: 0.8214
Epoch 189/200
53/53 [==============================] - 0s 5ms/step - loss: 0.1820 - accuracy: 0.9143 - val_loss: 0.3735 - val_accuracy: 0.8190
Epoch 190/200
53/53 [==============================] - 0s 5ms/step - loss: 0.1821 - accuracy: 0.9089 - val_loss: 0.3799 - val_accuracy: 0.8167
Epoch 191/200
53/53 [==============================] - 0s 5ms/step - loss: 0.1809 - accuracy: 0.9125 - val_loss: 0.3856 - val_accuracy: 0.8119
Epoch 192/200
53/53 [==============================] - 0s 4ms/step - loss: 0.1823 - accuracy: 0.9113 - val_loss: 0.3753 - val_accuracy: 0.8190
Epoch 193/200
53/53 [==============================] - 0s 5ms/step - loss: 0.1816 - accuracy: 0.9131 - val_loss: 0.3718 - val_accuracy: 0.8333
Epoch 194/200
53/53 [==============================] - 0s 5ms/step - loss: 0.1814 - accuracy: 0.9089 - val_loss: 0.3761 - val_accuracy: 0.8238
Epoch 195/200
53/53 [==============================] - 0s 5ms/step - loss: 0.1804 - accuracy: 0.9113 - val_loss: 0.3726 - val_accuracy: 0.8262
Epoch 196/200
53/53 [==============================] - 0s 5ms/step - loss: 0.1814 - accuracy: 0.9143 - val_loss: 0.3757 - val_accuracy: 0.8286
Epoch 197/200
53/53 [==============================] - 0s 5ms/step - loss: 0.1800 - accuracy: 0.9137 - val_loss: 0.3821 - val_accuracy: 0.8143
Epoch 198/200
53/53 [==============================] - 0s 6ms/step - loss: 0.1804 - accuracy: 0.9143 - val_loss: 0.3788 - val_accuracy: 0.8190
Epoch 199/200
53/53 [==============================] - 0s 6ms/step - loss: 0.1810 - accuracy: 0.9089 - val_loss: 0.3740 - val_accuracy: 0.8167
Epoch 200/200
53/53 [==============================] - 0s 3ms/step - loss: 0.1803 - accuracy: 0.9161 - val_loss: 0.3786 - val_accuracy: 0.8143
```

```
              precision    recall  f1-score   support

           0      0.840     0.783     0.811       175
           1      0.715     0.663     0.688       246
           2      0.868     0.923     0.895       479

    accuracy                          0.824       900
   macro avg      0.808     0.789     0.798       900
weighted avg      0.821     0.824     0.822       900
```

```
El tiempo de cómputo con RNA fue: 40.89 segundos
```

```python
# Definir la arquitectura del modelo de la RNA
modelRNA = models.Sequential()
modelRNA.add(Dense(10, batch_input_shape=(None, 35), activation='relu')) ## neuronas en la capa de entrada (batch_input_shape) y #neuronas en la primera capa oculta
modelRNA.add(Dense(10))
modelRNA.add(Dense(50))
modelRNA.add(Dense(3, activation='softmax'))
```

Conclusiones

- El aumento de la cantidad de capas no siempre implica que el valor de AUC se acerque más a 1.
- El aumento excesivo de neuronas disminuye el valor del AUC.
- El valor de AUC tiende a ser más alto manteniendo la cantidad de neuronas menor a 15.