# Reporte de Validación de Modelos 3D - Cáncer de Pulmón

Generado: 2025-07-21 13:18:30

Métricas Globales

| Modelo	Exactitud	Precision	Sensibilidad	Especificidad	F1	AUC-ROC	AP	Dice Score	MCC	Tiempo Inferencia (s)
3D ResNet50 SE	0.980	0.974	0.974	0.983	0.974	0.969	0.951	0.974	0.957	2.800
3D DenseNet121 AE	0.944	0.935	0.923	0.958	0.929	0.928	0.921	0.929	0.883	2.600
3D ResNet50	0.913	0.886	0.897	0.924	0.892	0.912	0.822	0.892	0.819	2.400
3D DenseNet121	0.832	0.869	0.679	0.932	0.763	0.822	0.771	0.763	0.647	2.300
CNN 3D Personalizada	0.602	0.500	0.590	0.610	0.541	0.569	0.444	0.541	0.196	0.800

Gráficos Comparativos
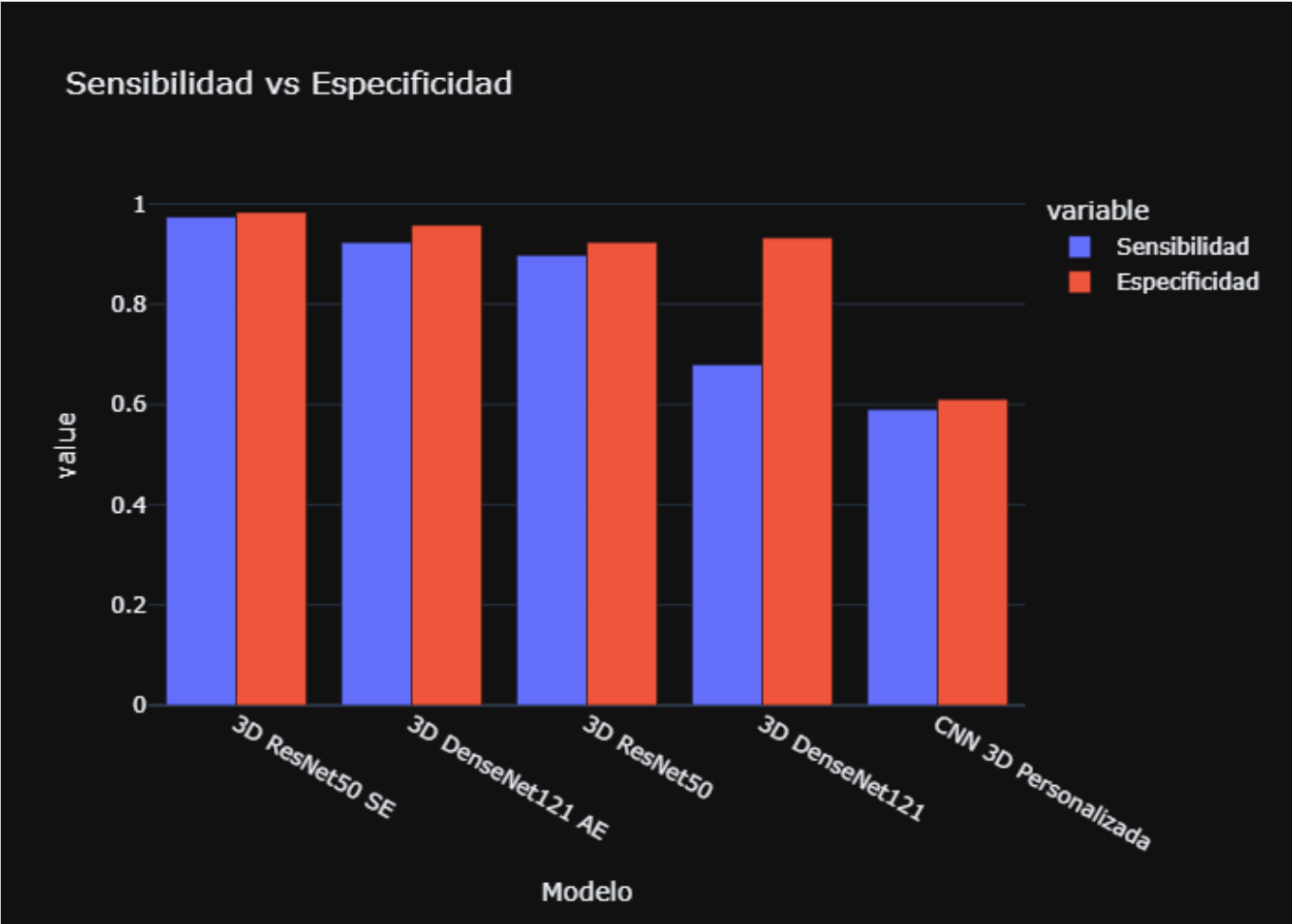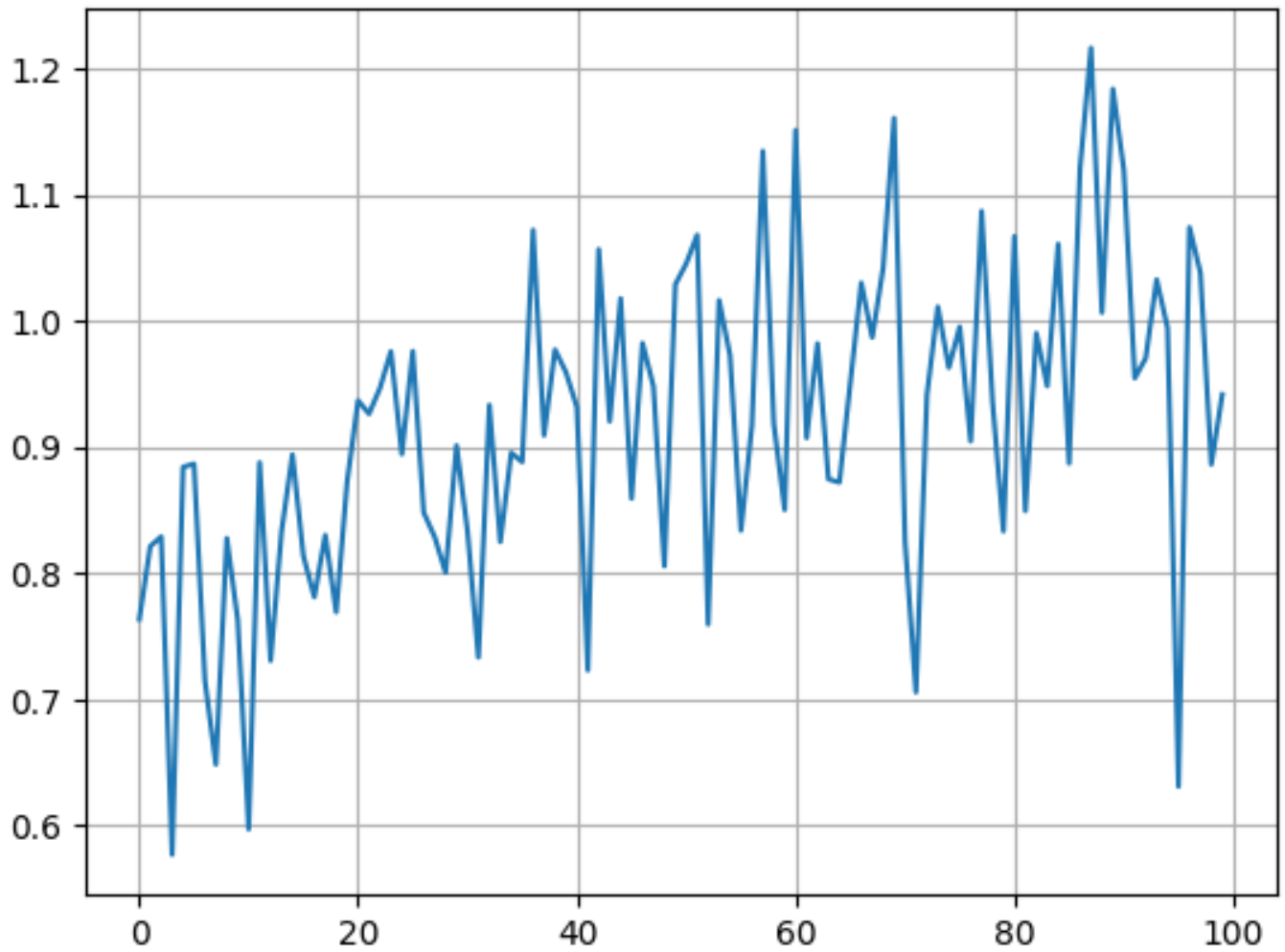
Rendimiento vs Velocidad
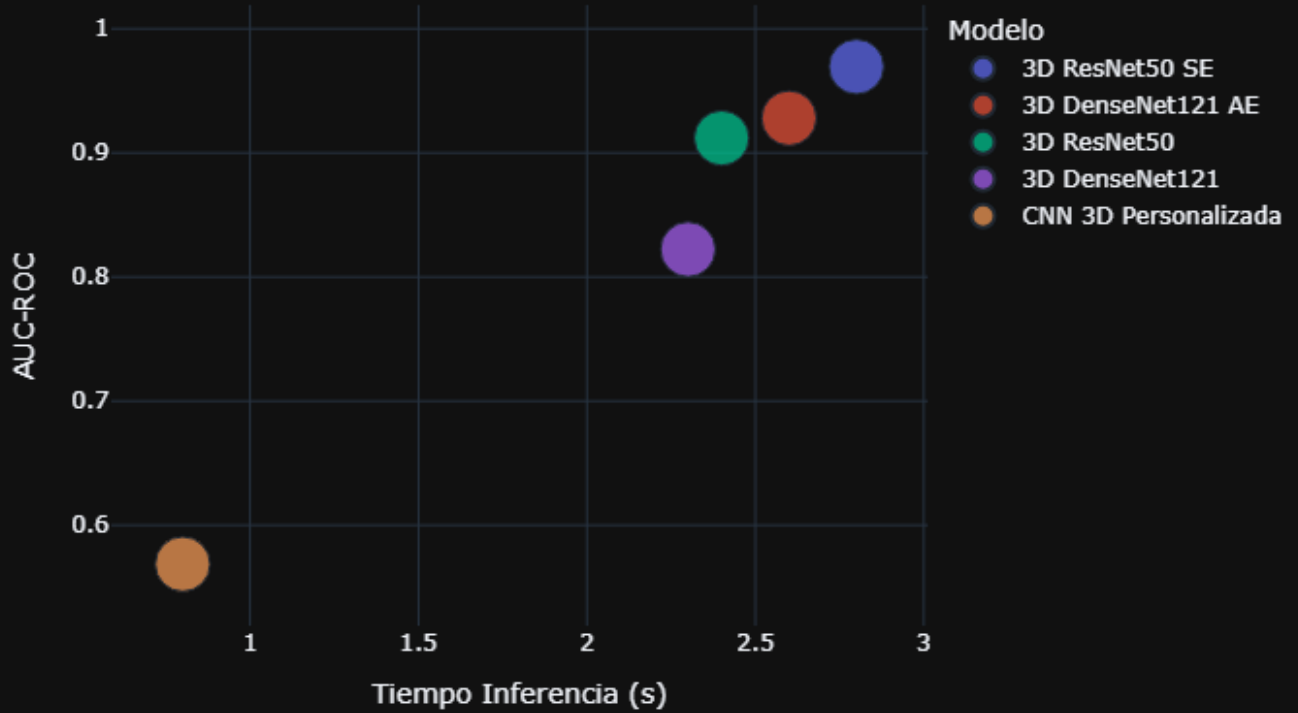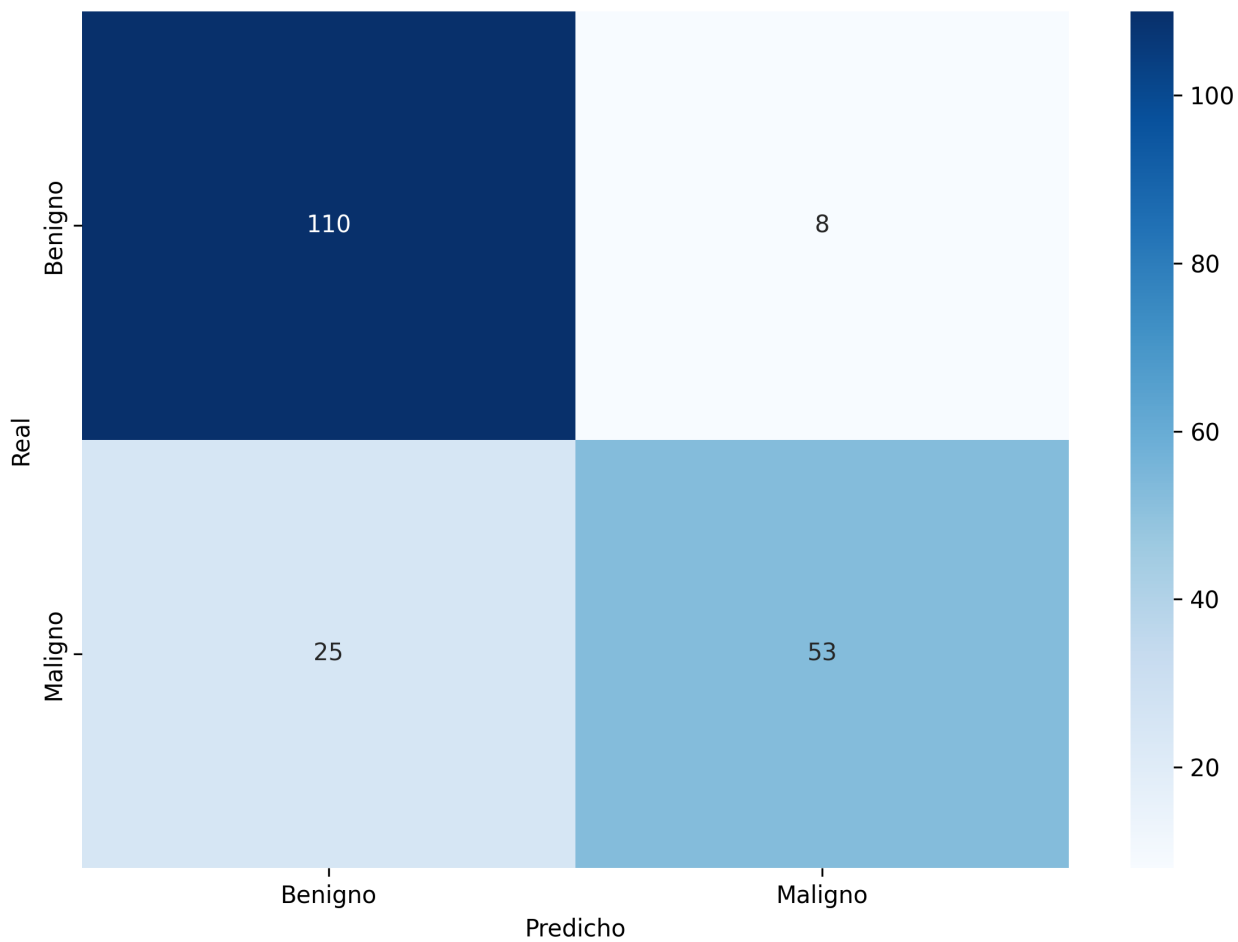

Dice Score por Modelo
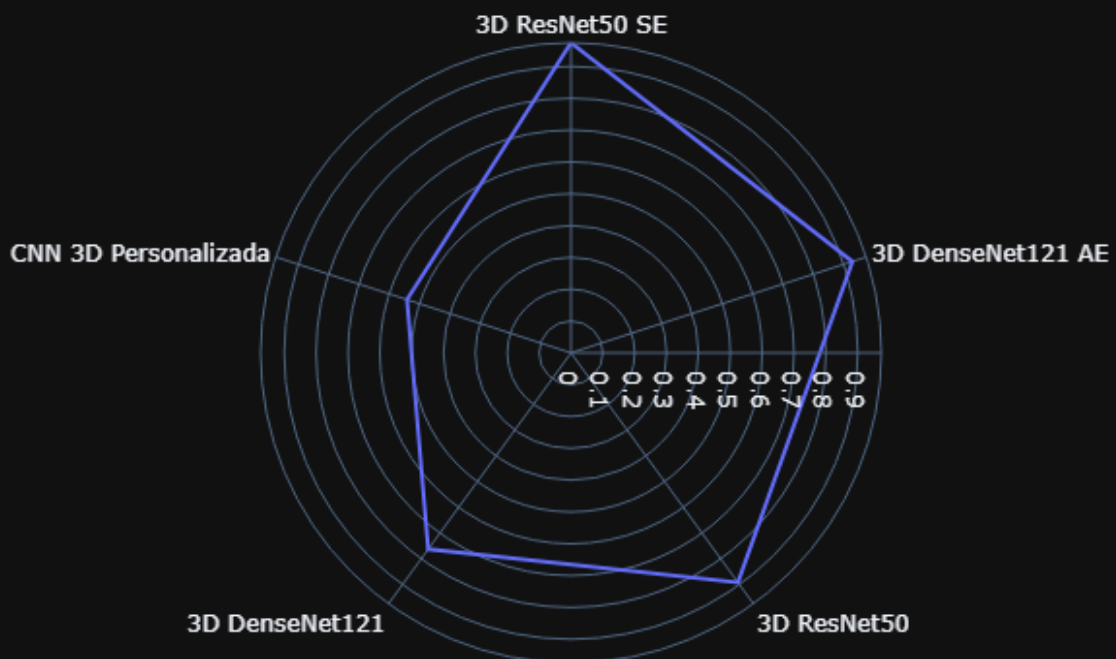
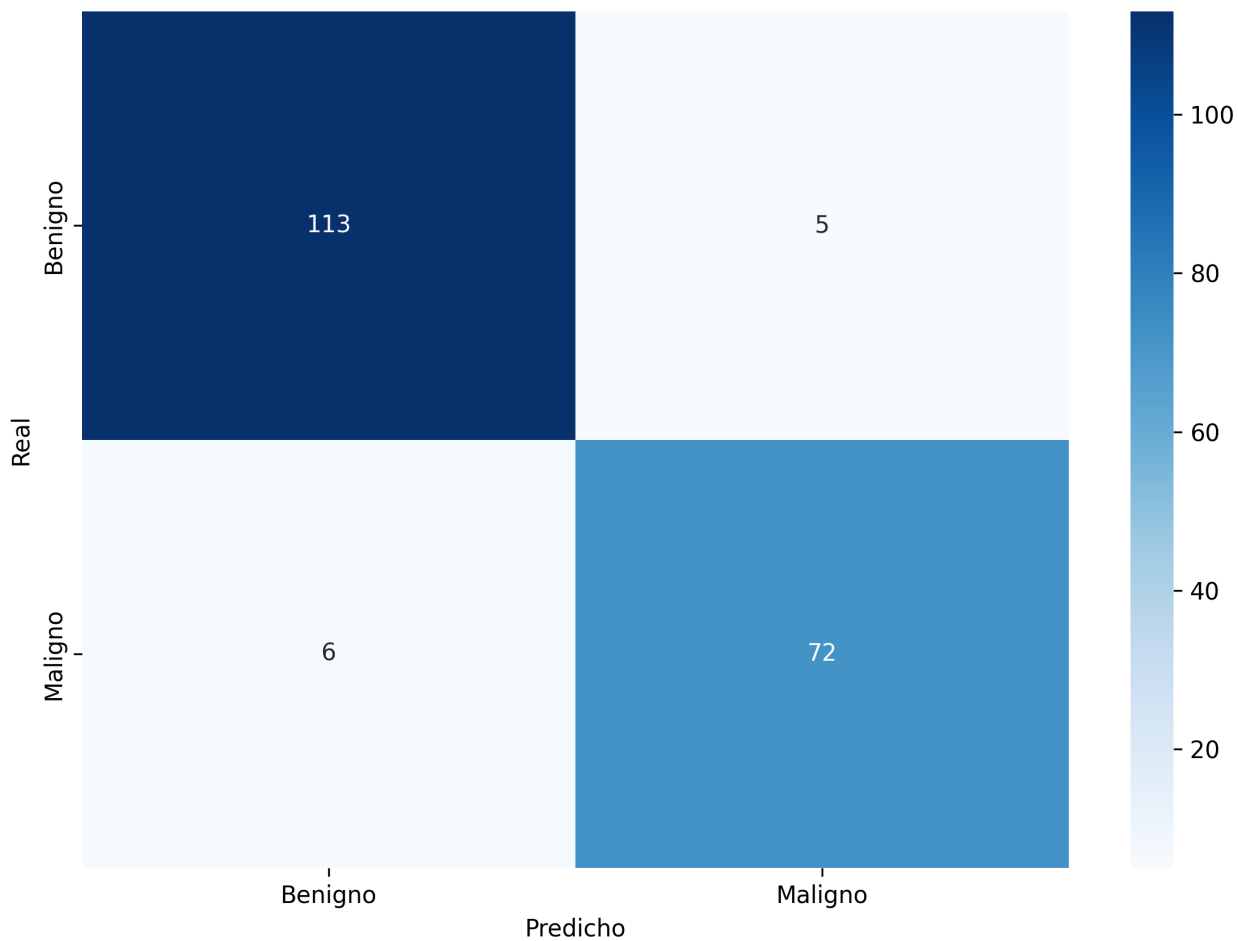Curva Optimización de Hiperparámetros

Curva Optimización de Hiperparámetros

Matrices de Confusión

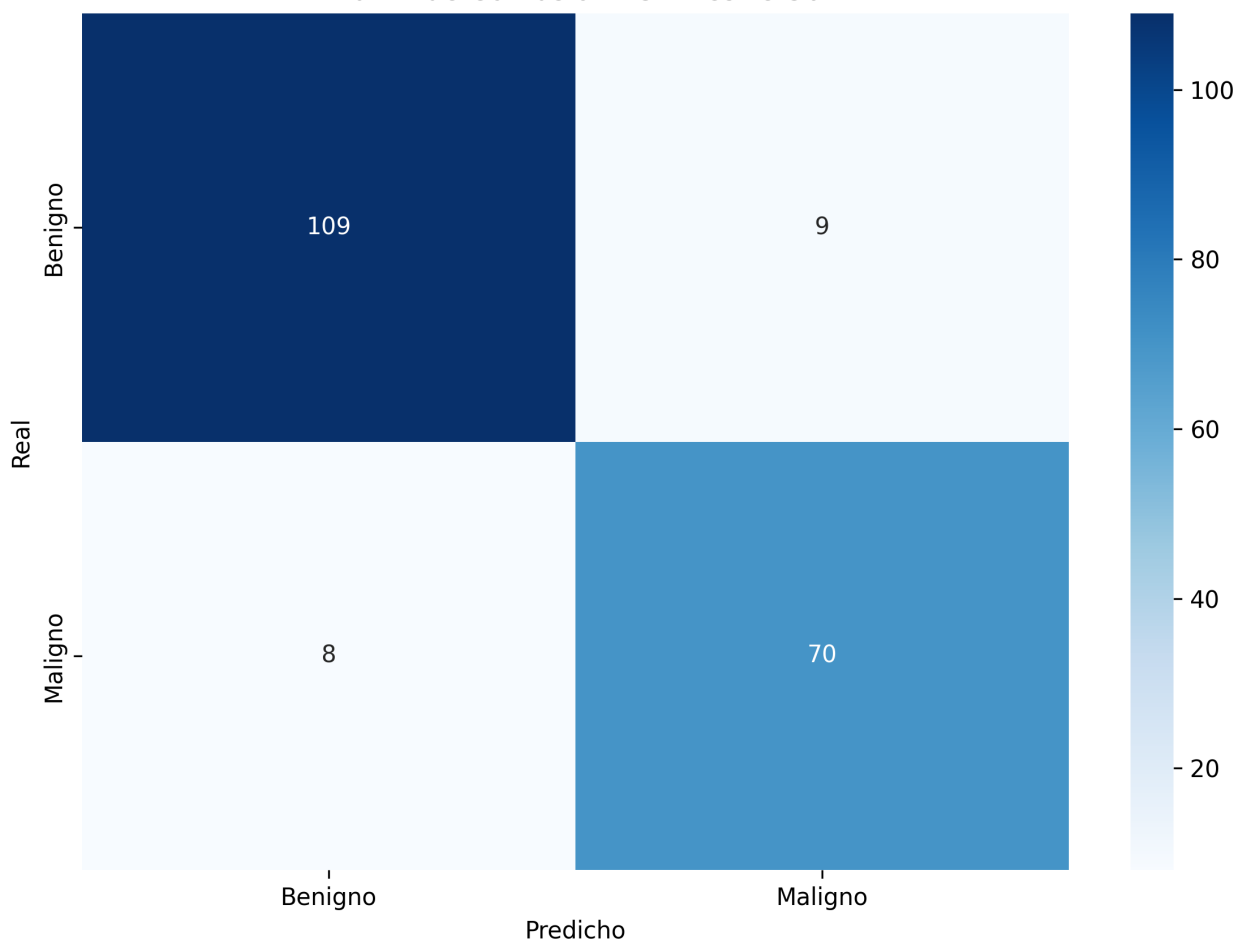Matriz de Confusión - 3D DenseNet121

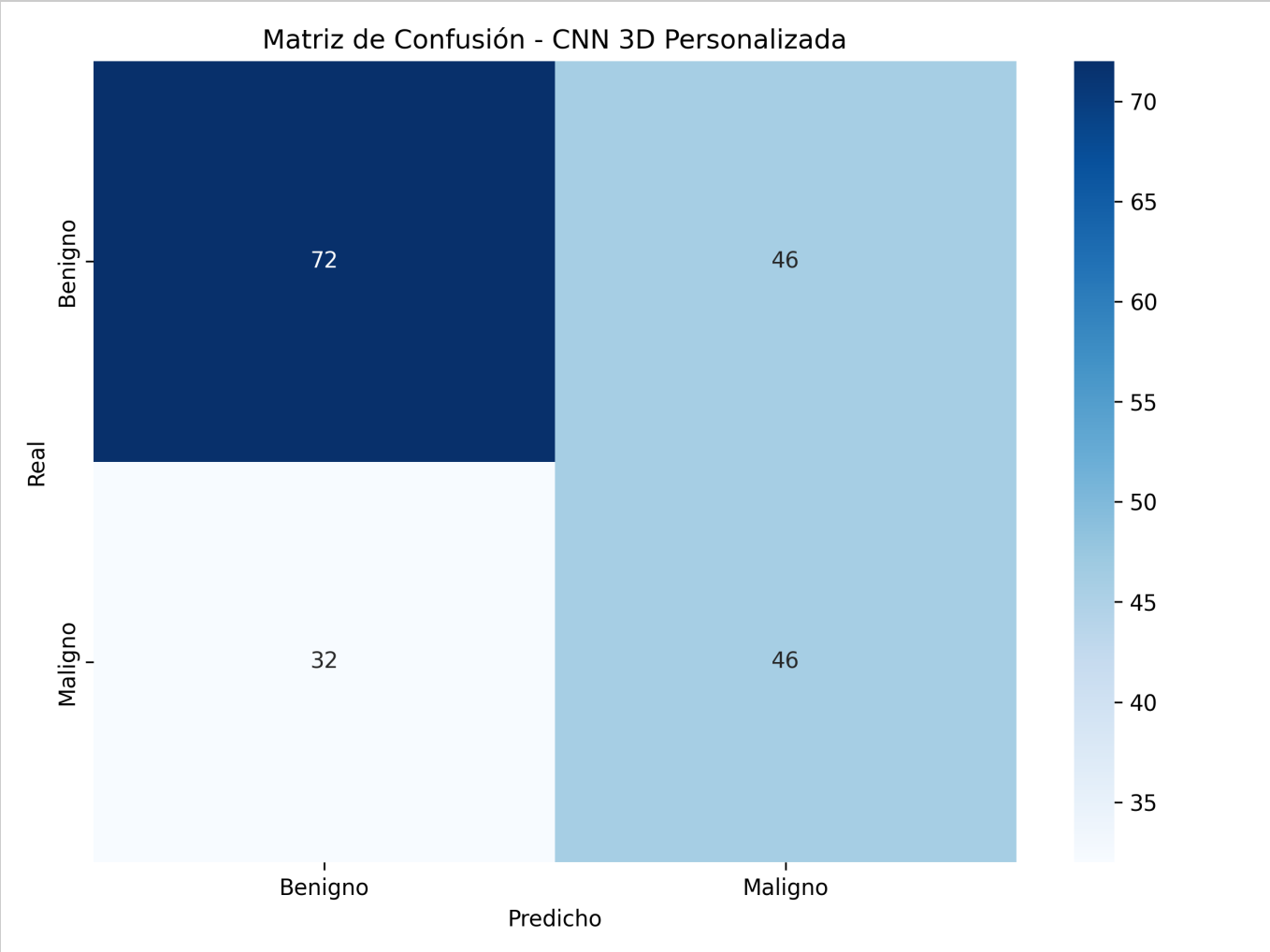|	Benigno	Maligno
Benigno	110	8
Maligno	25	53

Matriz de Confusión - 3D DenseNet121 AE

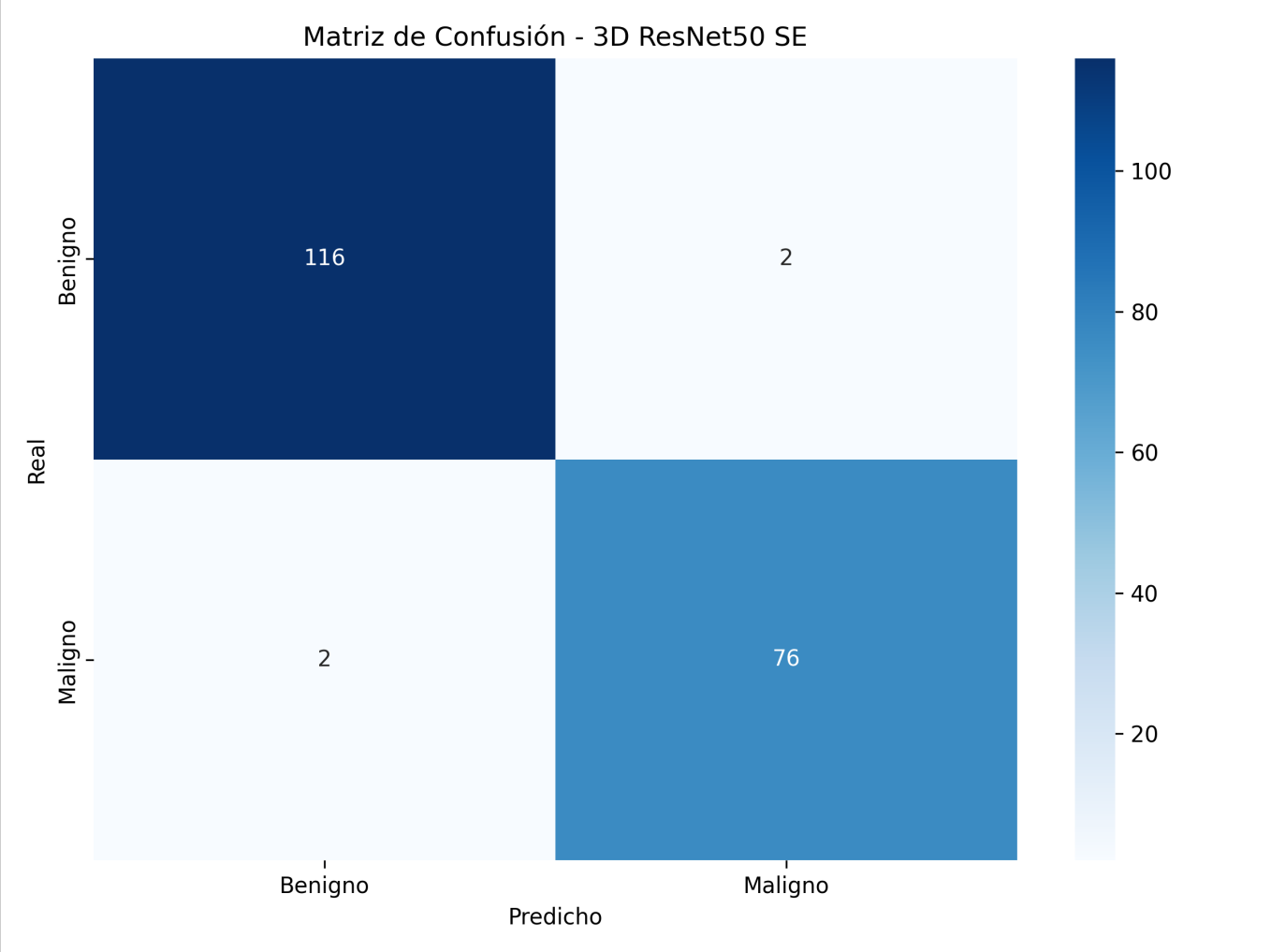|	Benigno	Maligno
Benigno	113	5
Maligno	6	72

Matriz de Confusión - 3D ResNet50

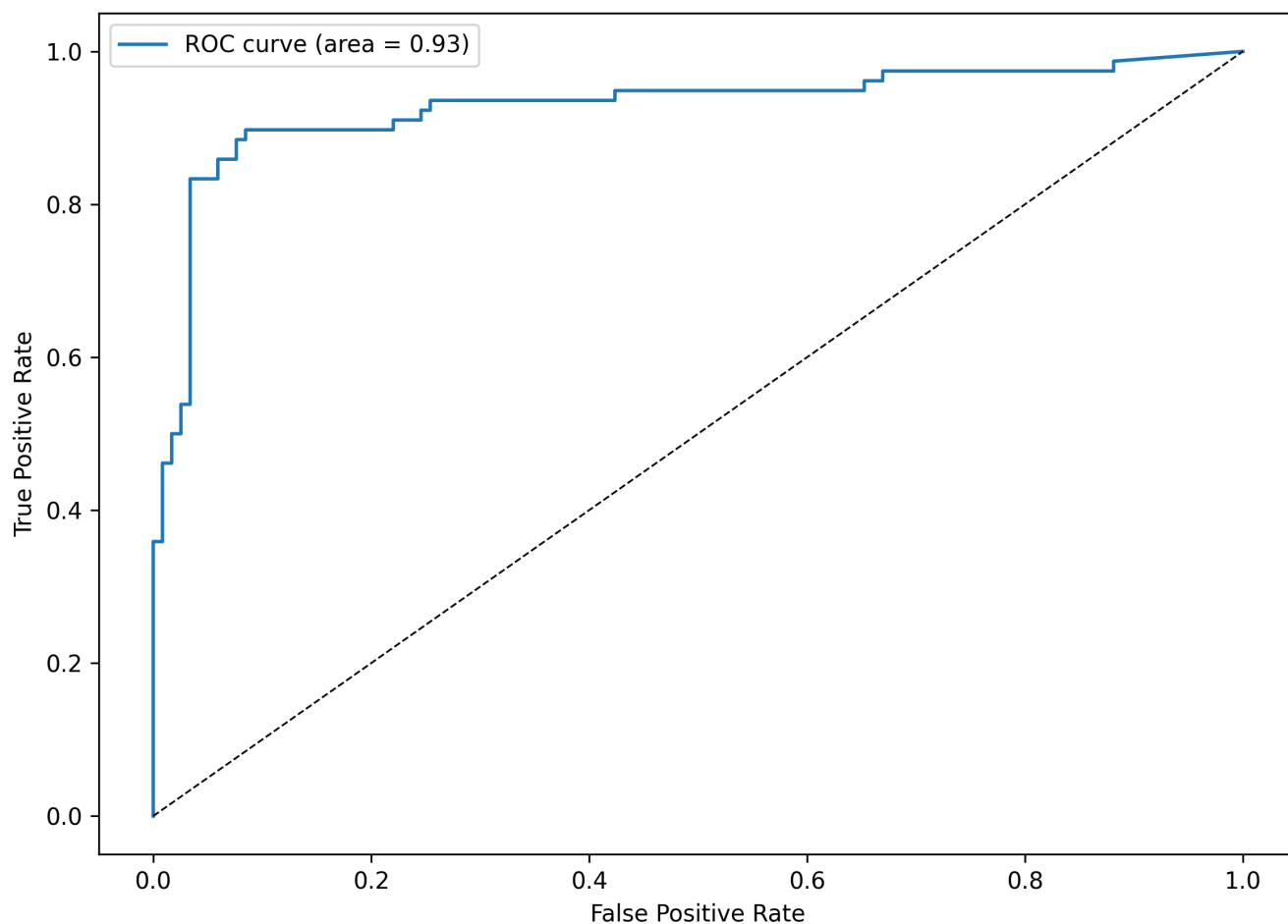Matriz de Confusión - 3D ResNet50 SE

Matriz de Confusión - CNN 3D Personalizada

Curvas ROC / PR

Curva ROC - 3D DenseNet121

Curva ROC - 3D DenseNet121 AE

ROC curve (area = 0.93)

True Positive Rate

False Positive Rate

Curva ROC - 3D ResNet50

ROC curve (area = 0.91)

True Positive Rate

False Positive Rate
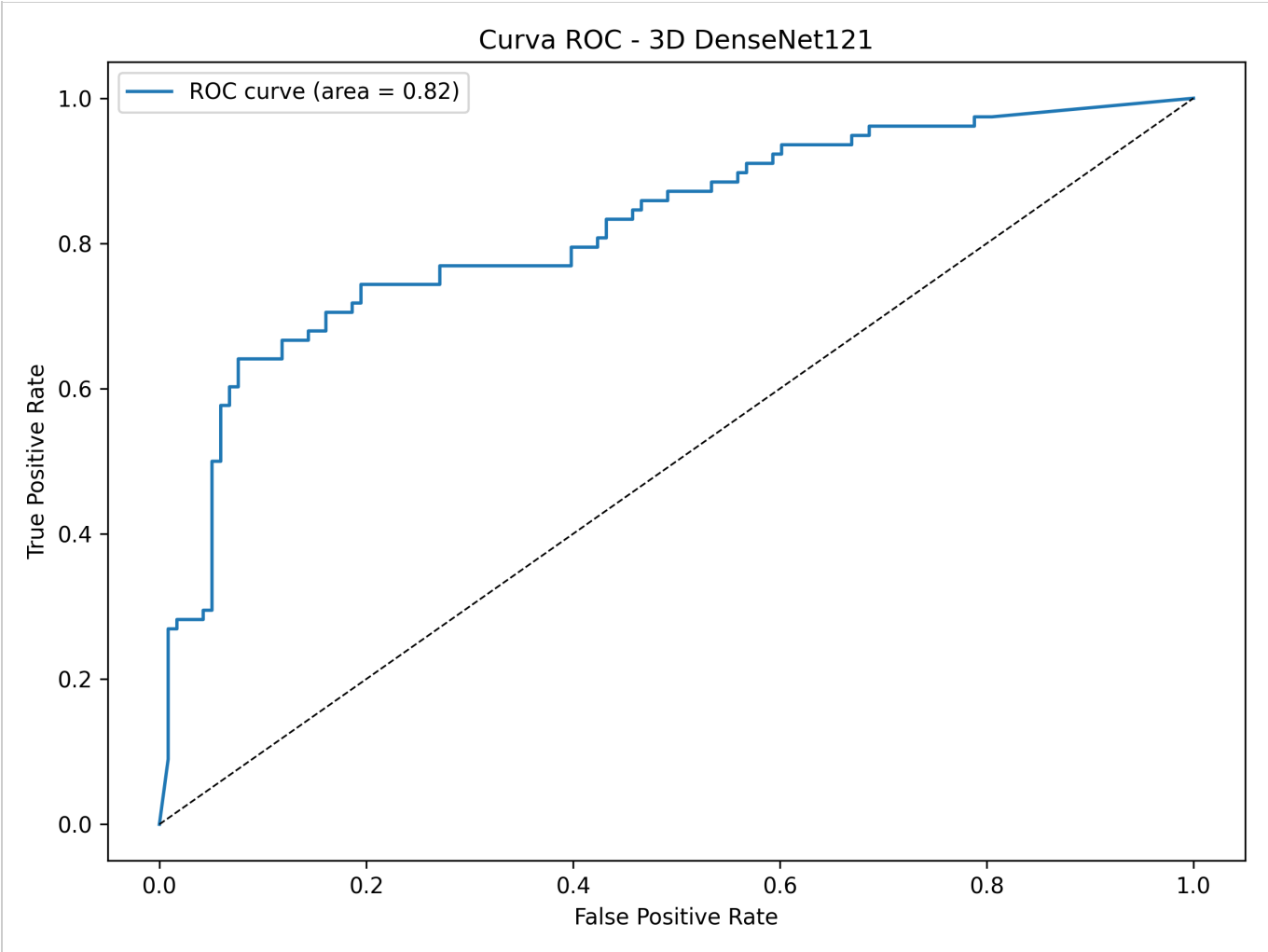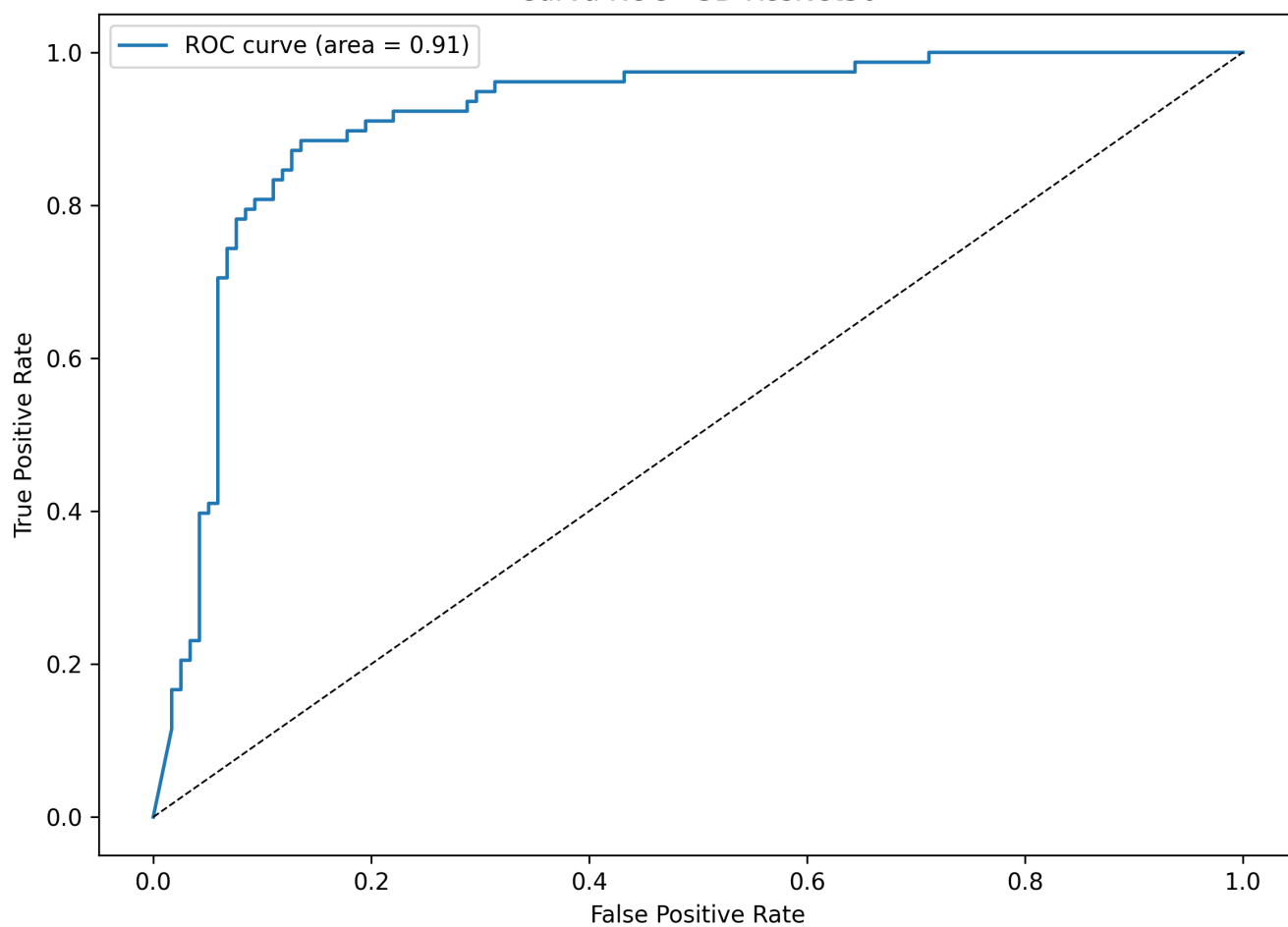
Curva ROC - 3D ResNet50 SE

ROC curve (area = 0.97)
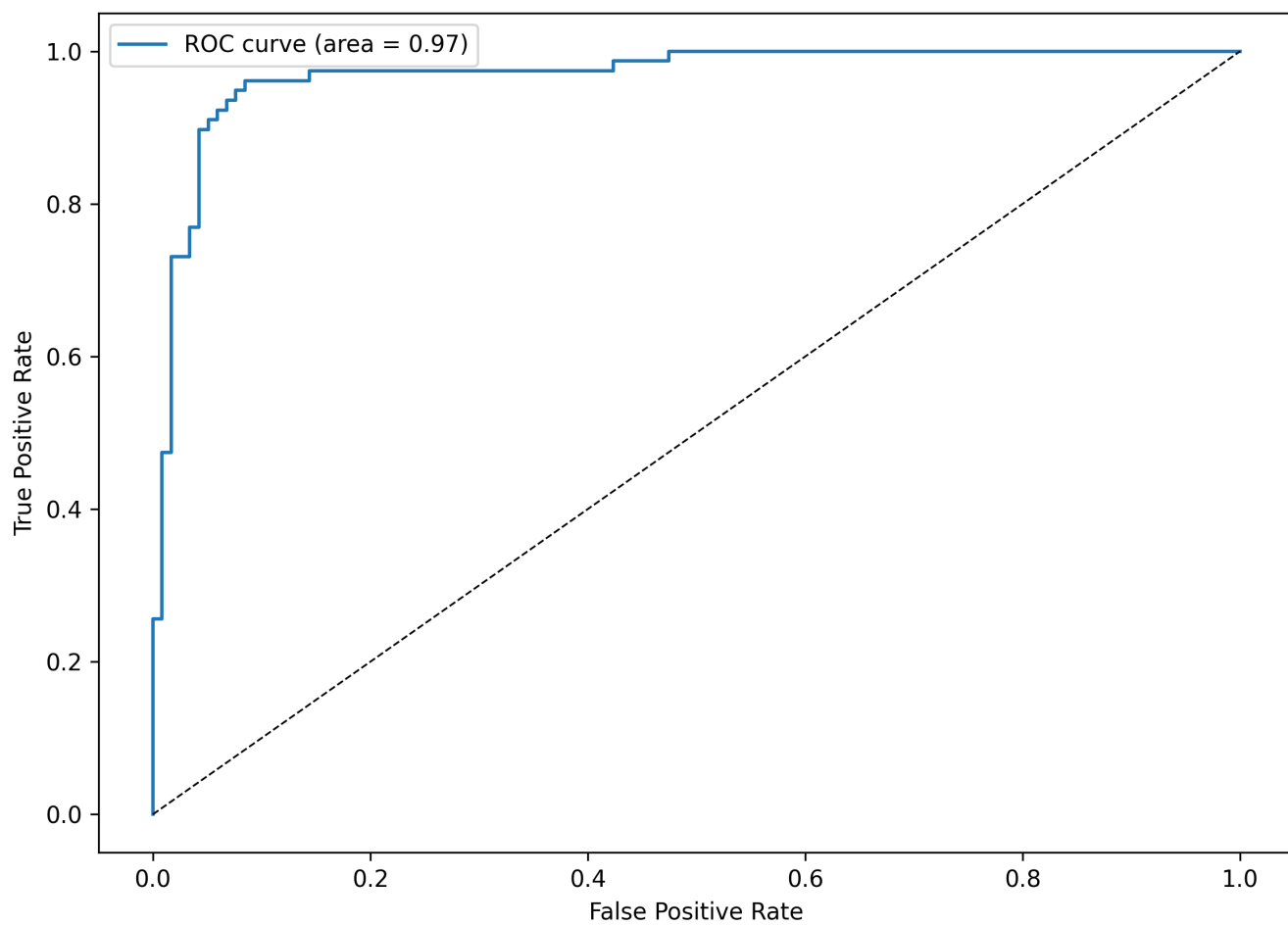
Curva ROC - CNN 3D Personalizada

ROC curve (area = 0.57)

Curva Precision-Recall - 3D DenseNet121

PR curve (AP = 0.77)
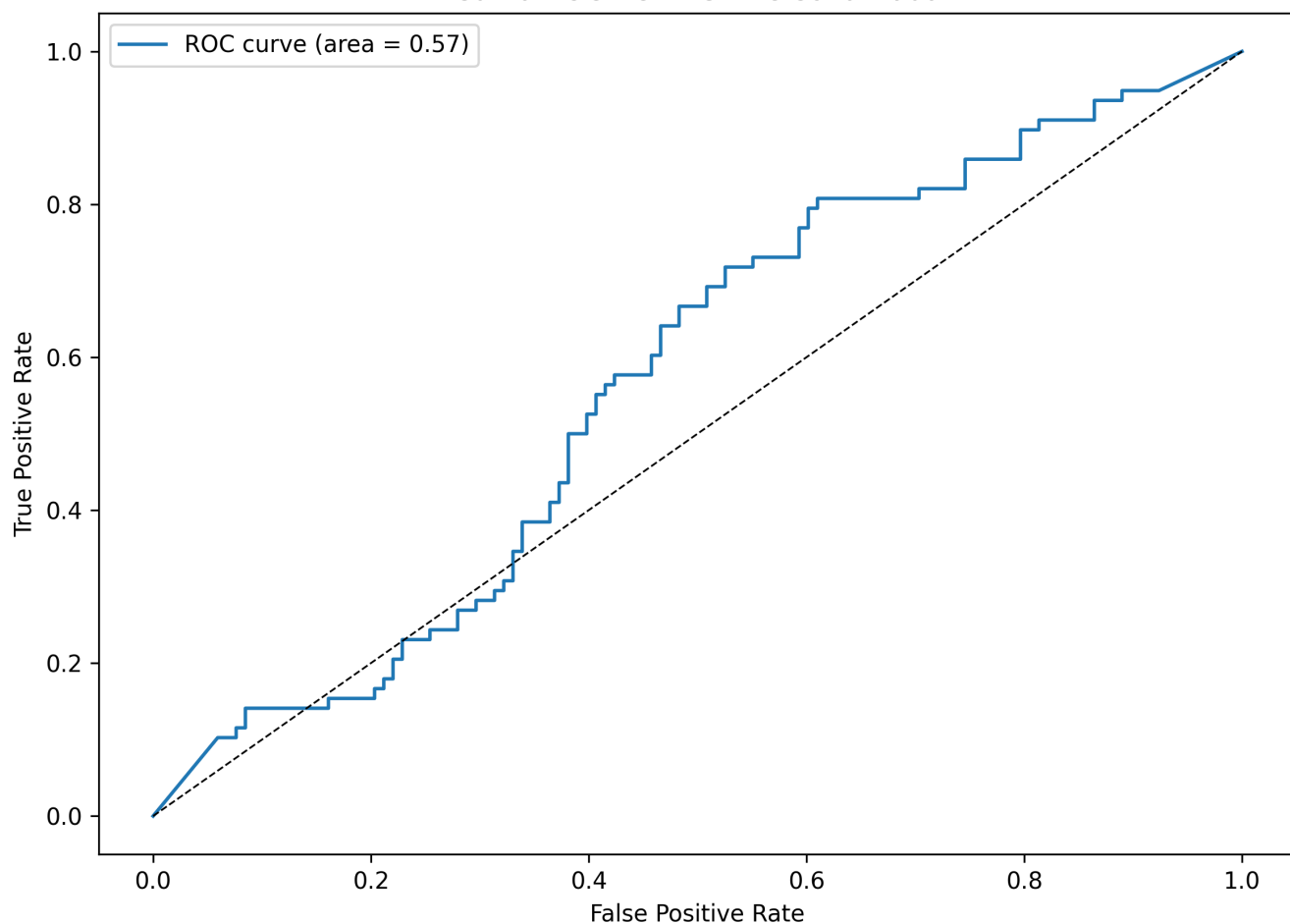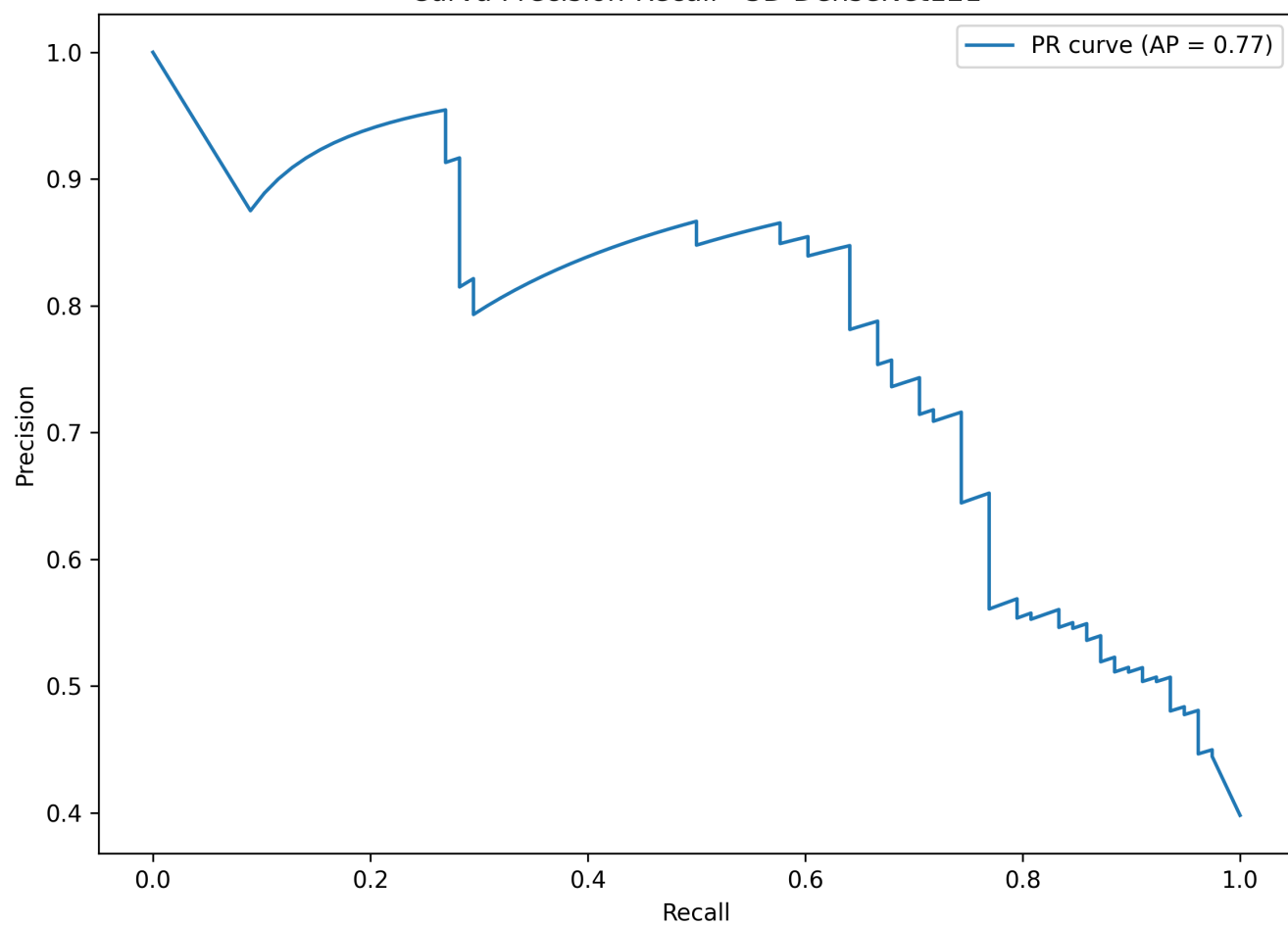
Curva Precision-Recall - 3D DenseNet121 AE

Curva Precision-Recall - 3D ResNet50

PR curve (AP = 0.82)

Curva Precision-Recall - 3D ResNet50 SE

PR curve (AP = 0.95)

Curva Precision-Recall - CNN 3D Personalizada
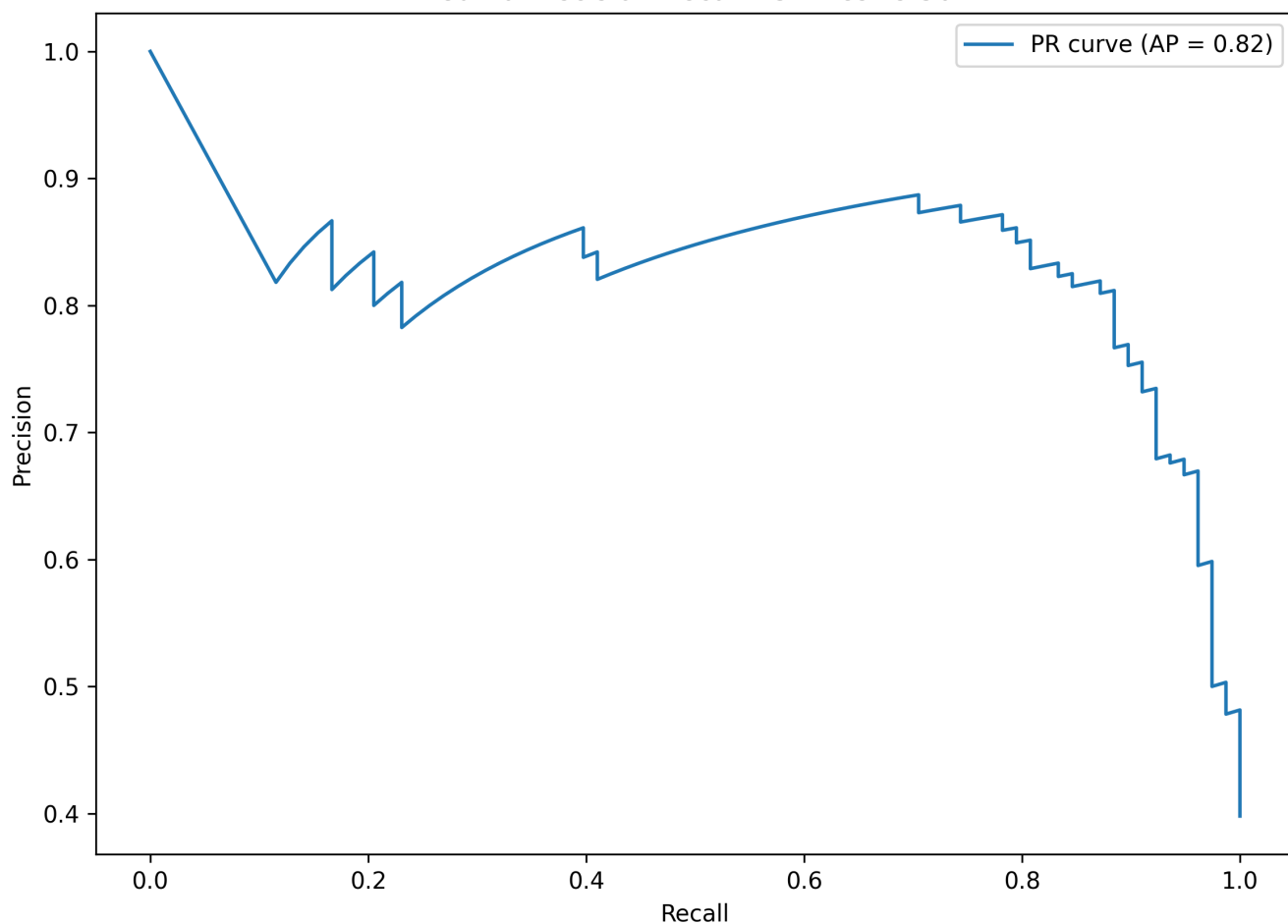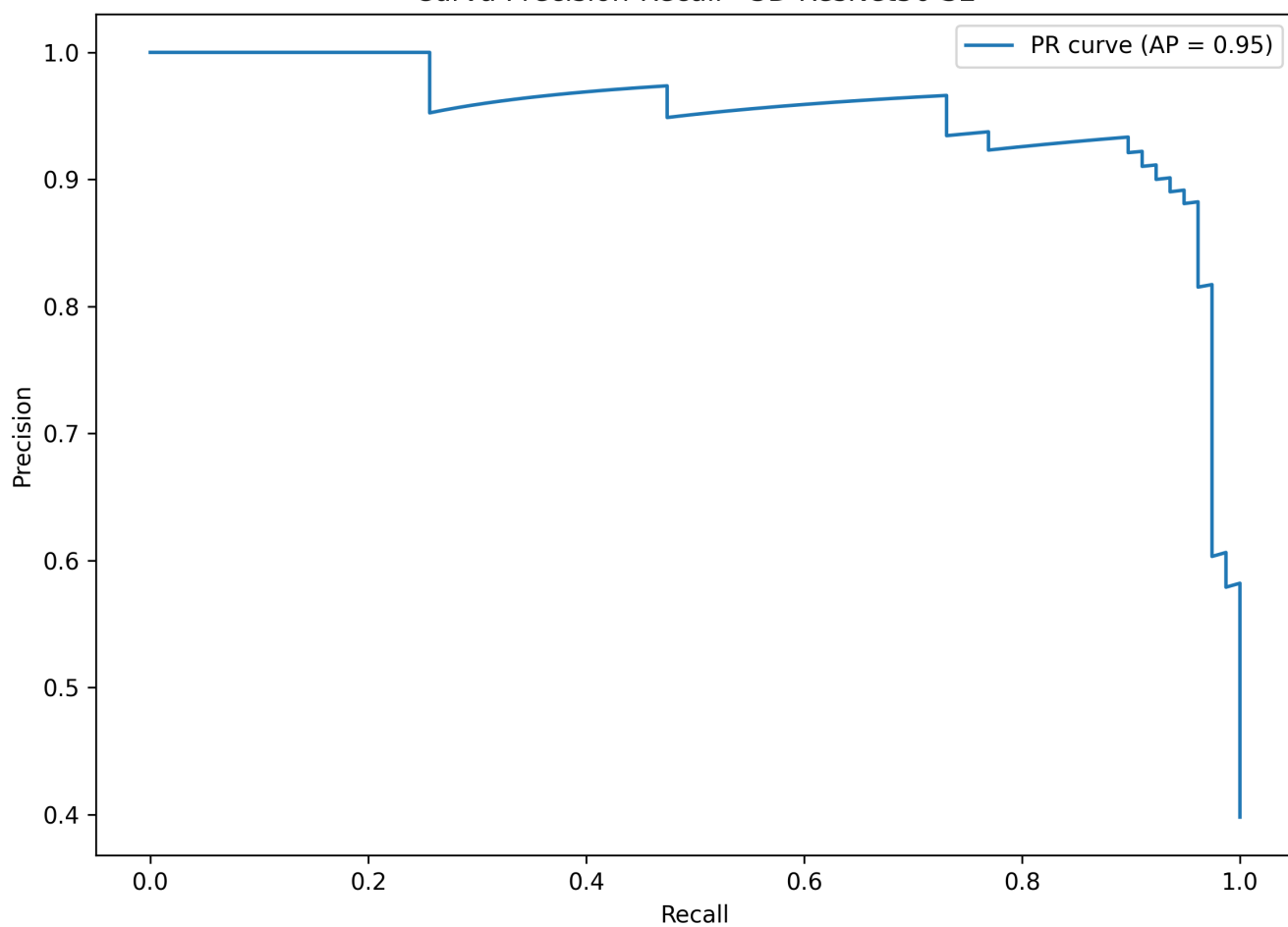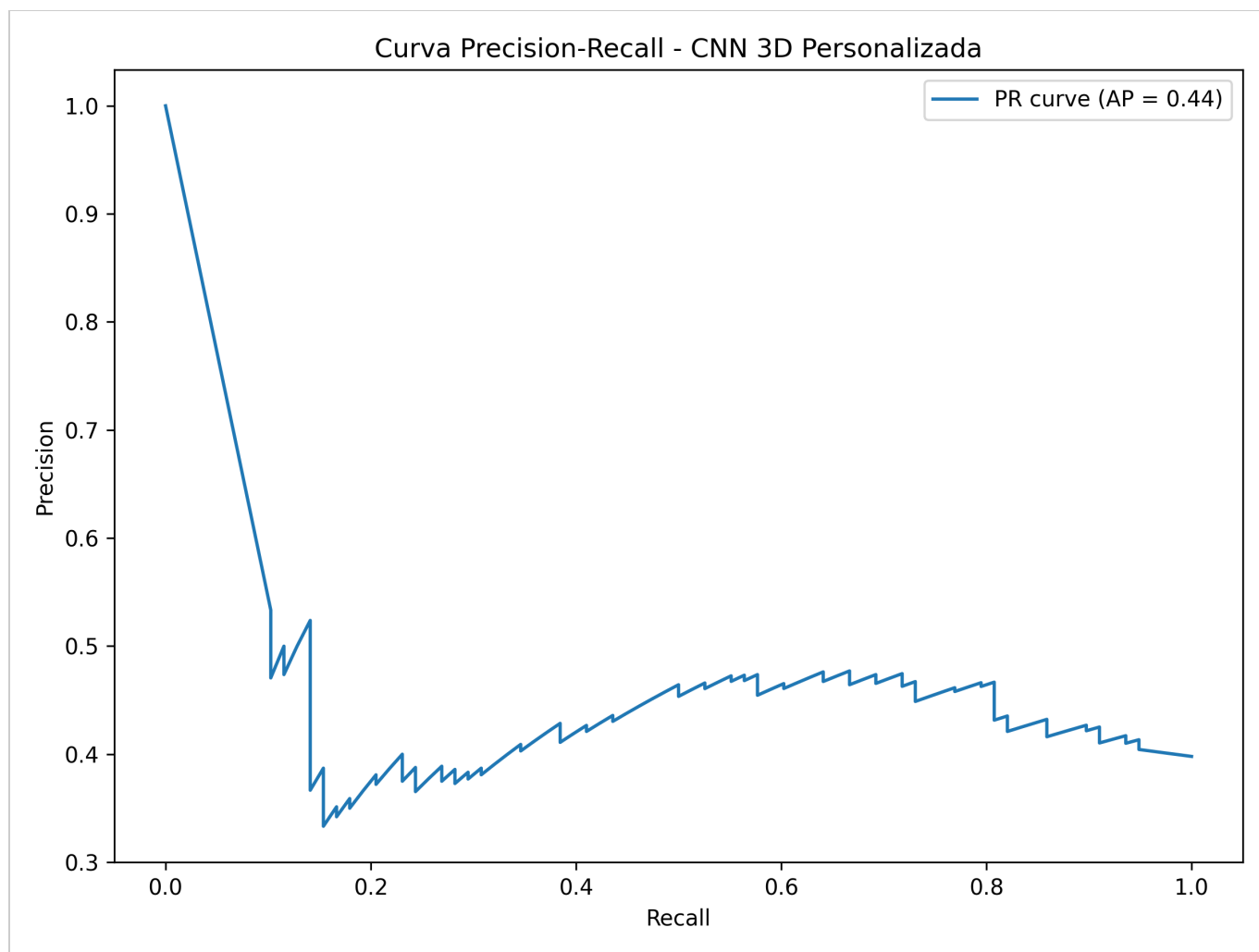
Pruebas McNemar

McNemar: 3D DENSENET121 AE vs 3D RESNET50 SE
χ² = 5.14, p = 0.023

	3D RESNET50 SE ok	3D RESNET50 SE err
3D DENSENET121 AE ok	185	0
3D DENSENET121 AE err	7	4

McNemar: 3D DENSENET121 vs 3D DENSENET121 AE
χ² = 20.05, p = 0.000

	3D DENSENET121 AE ok	3D DENSENET121 AE err
3D DENSENET121 ok	163	0
3D DENSENET121 err	22	11

McNemar: 3D DENSENET121 vs 3D RESNET50
χ² = 12.50, p = 0.000

	3D RESNET50 ok	3D RESNET50 err
3D DENSENET121 ok	162	1
3D DENSENET121 err	17	16

McNemar: 3D DENSENET121 vs 3D RESNET50 SE
χ² = 27.03, p = 0.000

	3D RESNET50 SE ok	3D RESNET50 SE err
3D DENSENET121 ok	163	0
3D DENSENET121 err	29	4

McNemar: 3D DENSENET121 vs CNN 3D PERSONALIZADO
χ² = 43.02, p = 0.000

	CNN 3D PERSONALIZADO ok	CNN 3D PERSONALIZADO err
3D DENSENET121 ok	118	45
3D DENSENET121 err	0	33

McNemar: 3D RESNET50 vs 3D DENSENET121 AE
χ² = 4.17, p = 0.041

	3D DENSENET121 AE ok	3D DENSENET121 AE err
3D RESNET50 ok	179	0
3D RESNET50 err	6	11

McNemar: 3D RESNET50 vs 3D RESNET50 SE
$\chi^2 = 11.08$, p = 0.001

	3D RESNET50 SE ok	3D RESNET50 SE err
3D RESNET50 ok	179	0
3D RESNET50 err	13	4

McNemar: 3D RESNET50 vs CNN 3D PERSONALIZADO
$\chi^2 = 59.02$, p = 0.000

	CNN 3D PERSONALIZADO ok	CNN 3D PERSONALIZADO err
3D RESNET50 ok	118	61
3D RESNET50 err	0	17

McNemar: CNN 3D PERSONALIZADO vs 3D DENSENET121 AE
$\chi^2 = 65.01$, p = 0.000

	3D DENSENET121 AE ok	3D DENSENET121 AE err
CNN 3D PERSONALIZADO ok	118	0
CNN 3D PERSONALIZADO err	67	11

McNemar: CNN 3D PERSONALIZADO vs 3D RESNET50 SE
$\chi^2 = 72.01$, p = 0.000

	3D RESNET50 SE ok	3D RESNET50 SE err
CNN 3D PERSONALIZADO ok	118	0
CNN 3D PERSONALIZADO err	74	4