

# Model architecture details

## CVAE shared encoder

Model: "z\_encoder"

Layer (type)	Output Shape	Param #	Connected to
tg_inputs (InputLayer)	[(None, 64, 64, 64, 0		
conv3d_2 (Conv3D)	(None, 32, 32, 32, 6 1792		tg_inputs[0][0]
conv3d_3 (Conv3D)	(None, 16, 16, 16, 1 221312		conv3d_2[0][0]
flatten_1 (Flatten)	(None, 524288)	0	conv3d_3[0][0]
dense_3 (Dense)	(None, 128)	67108992	flatten_1[0][0]
z_mean (Dense)	(None, 16)	2064	dense_3[0][0]
z_log_var (Dense)	(None, 16)	2064	dense_3[0][0]
z (Lambda)	(None, 16)	0	z_mean[0][0] z_log_var[0][0]
Total params: 67,336,224			
Trainable params: 67,336,224			
Non-trainable params: 0			

## CVAE ASD-specific encoder

Model: "s\_encoder"

Layer (type)	Output Shape	Param #	Connected to
tg_inputs (InputLayer)	[(None, 64, 64, 64, 0		
conv3d_4 (Conv3D)	(None, 32, 32, 32, 6 1792		tg_inputs[0][0]
conv3d_5 (Conv3D)	(None, 16, 16, 16, 1 221312		conv3d_4[0][0]
flatten_2 (Flatten)	(None, 524288)	0	conv3d_5[0][0]
dense_4 (Dense)	(None, 128)	67108992	flatten_2[0][0]
s_mean (Dense)	(None, 16)	2064	dense_4[0][0]
s_log_var (Dense)	(None, 16)	2064	dense_4[0][0]
s (Lambda)	(None, 16)	0	s_mean[0][0] s_log_var[0][0]
Total params: 67,336,224			
Trainable params: 67,336,224			
Non-trainable params: 0			

# CVAE decoder

Model: "decoder"

Layer (type)	Output Shape	Param #
z_sampling (InputLayer)	[(None, 32)]	0
dense_5 (Dense)	(None, 128)	4224
dense_6 (Dense)	(None, 524288)	67633152
reshape_1 (Reshape)	(None, 16, 16, 16, 128)	0
conv3d_transpose_2 (Conv3DTr	(None, 32, 32, 32, 32)	110624
conv3d_transpose_3 (Conv3DTr	(None, 64, 64, 64, 16)	13840
decoder_output (Conv3DTransp	(None, 64, 64, 64, 1)	433
Total params: 67,762,273		
Trainable params: 67,762,273		
Non-trainable params: 0		

# VAE model

Model: "vae"

Layer (type)	Output Shape	Param #	Connected to
encoder_input (InputLayer)	[(None, 64, 64, 64, 0		
encoder (Functional)	[(None, 32), (None, 33619072		encoder_input[0][0]
decoder (Functional)	(None, 64, 64, 64, 1 33987649		encoder[0][2]
conv3d (Conv3D)	(None, 32, 32, 32, 3 896		encoder_input[0][0]
conv3d_1 (Conv3D)	(None, 16, 16, 16, 6 55360		conv3d[0][0]
flatten (Flatten)	(None, 262144)	0	conv3d_1[0][0]
dense (Dense)	(None, 128)	33554560	flatten[0][0]
z_log_var (Dense)	(None, 32)	4128	dense[0][0]
z_mean (Dense)	(None, 32)	4128	dense[0][0]
tf_op_layer_AddV2 (TensorFlowOp	[(None, 32)]	0	z_log_var[0][0]
tf_op_layer_Square (TensorFlowO	[(None, 32)]	0	z_mean[0][0]
tf_op_layer_Reshape_1 (TensorFl	[(None,)]	0	decoder[0][0]
tf_op_layer_Reshape (TensorFlow	[(None,)]	0	encoder_input[0][0]
tf_op_layer_Sub (TensorFlowOpLa	[(None, 32)]	0	tf_op_layer_AddV2[0][0] tf_op_layer_Square[0][0]
tf_op_layer_Exp (TensorFlowOpLa	[(None, 32)]	0	z_log_var[0][0]
tf_op_layer_SquaredDifference (	[(None,)]	0	tf_op_layer_Reshape_1[0][0] tf_op_layer_Reshape[0][0]
tf_op_layer_Sub_1 (TensorFlowOp	[(None, 32)]	0	tf_op_layer_Sub[0][0] tf_op_layer_Exp[0][0]
tf_op_layer_Mean (TensorFlowOpL	[()]	0	tf_op_layer_SquaredDifference[0][
tf_op_layer_Sum (TensorFlowOpLa	[(None,)]	0	tf_op_layer_Sub_1[0][0]
tf_op_layer_Mul (TensorFlowOpLa	[()]	0	tf_op_layer_Mean[0][0]
tf_op_layer_Mul_1 (TensorFlowOp	[(None,)]	0	tf_op_layer_Sum[0][0]
tf_op_layer_Mean_1 (TensorFlowO	[()]	0	tf_op_layer_Mul[0][0]
tf_op_layer_Mean_2 (TensorFlowO	[()]	0	tf_op_layer_Mul_1[0][0]
tf_op_layer_AddV2_1 (TensorFlow	[()]	0	tf_op_layer_Mean_1[0][0] tf_op_layer_Mean_2[0][0]
add_loss (AddLoss)	()	0	tf_op_layer_AddV2_1[0][0]
Total params: 67,606,721			
Trainable params: 67,606,721			
Non-trainable params: 0			