

Appendix A. Details of deep learning architectures for MS researches

Works	DNN	Details	Classifier	Loss Function	Optimizer
Marzullo [149]	2D-CNN	2 Conv + 2 Max Pooling + 2 Dropout + 2 BN + 2 FC	Linear	--	Adam
Siar [154]	2D-CNN	25 Layers	Softmax	--	--
Aslani [155]	2D-CNN	ResNet50 + UFF Blocks	--	BCE	Adadelta
Eitel [158]	2D-CNN	5 Conv + 5 BN + PIF	--	--	--
Afzal [159]	2D-CNN	2 Conv + 2 Max Pooling + 1 FC	Multinomial LR	--	--
Roy [172]	2D-CNN	15 Conv	--	--	Adam
Aslani [184]	2D-CNN	3 Parallel ResNet50s + 5 MMFF Blocks + 4 MSFU Blocks + MPR Block	Softmax	soft Dice Loss function	Adam
Alijamaat [190]	2D-CNN	15 Conv + 1 Average Pooling + 1 FC + Dropout	Sigmoid	--	Adam
Shrwan [223]	2D-CNN	3 Conv + 3 BN + 3 Max Pooling + 2 FC	Softmax	CE	SGDM
Afzal [225]	Two 2D-CNN	6 Conv + 6 Max Pooling	--	--	Proposed
Wang [181]	2D-CNN	11 Conv + 11 BN + 4 Pooling + 3 FC + 2 Dropout	Softmax	--	--
Ulloa [135]	V-Net CNN	3 Conv + 3 Max Pooling + 2 FC + 5 Dropout	Sigmoid	BCE and Focal Loss	SGD
Birenbaum [179]	4 CNN Models	V-Net, L-Net, Multi-View CNN, Multi-View Longitudinal CNN	Softmax	CCE	Adadelta
Birenbaum [165]	4 CNN Models	V-Net, L-Net, Multi-View Longitudinal CNN, Multi-View CNN	--	CCE	Adadelta
SALEM [156]	Encoder-Decoder U-NET	2 Encoders and 2 Decoders	--	CCE	Adadelta
	Cascaded 3D CNNs	Cascade of 2 Identical CNNs			
Roca [127]	3D-CNN	6 Conv + 3 BN + 3 Max Pooling + 2 Dense	Linear Activation	MSE	Adam
Nair [129]	3D-CNN	12 Conv + 4 De-Conv + 4 Dropout + 4 Skip Connection	Sigmoid	Weighted BCE	Adam
Brown [132]	3D-CNN	6 Conv + 4 De-Conv and Up Sampling + 4 Concatenation	Softmax	CCE	Adam
Sepahvand [152]	3D CNN	10 Conv + 4 Max Pooling + 4 BN + 4 Dropout + 2 FC	Sigmoid	CE	Adam
	Modified U-net	17 Conv + 7 BN + Dropout + 3 Max Pooling + 3 De-Conv + 3 Concatenation			
Rosa [153]	Cascade of Two 3D Patch-Wise CNNs	4 Conv + 2 Max Pooling + 4 BN + 1 FC + 1 Dropout	Softmax	CE	Adam
Toussignant [162]	3D-CNN	3 Consecutive Conv Blocks + 2 FC + 5 Dropout	Sigmoid	CE	RMSProp
Yoo [163]	3D-CNN	3 Conv + 3 Max Pooling + 2 FC + 2 Dropout	LR	CE	Adadelta
Kazaneli [168]	Two 3D-CNNs in a Cascade Fashion	2 Conv + 2 Average Pooling + 2 BN + 1 FC + 1 Dropout	Softmax	CE	Adam
Gros [169]	Sequence of Two CNNs	First CNN with 2D Dilated Convolutions, Second CNN with 3D Convolutions	--	Dice Loss	Adam
Valverde [173]	3D-CNN	4 Conv + 2 Max-Pooling + 4 BN + 3 FC + 3 Dropout	Softmax	CCE	Adadelta
Zhang [176]	3D-CNN	7 Conv + 7 Pooling + 3 FC + 3 Dropout	Softmax	--	--
Yoo [178]	3D-CNN	3 Conv + 3 Max Pooling + 2 FC + 2 Dropout	LR	CE	Adadelta
Eitel [188]	3D-CNN	4 Conv + 4 Max-Pooling + 4 Dropout	Sigmoid	--	Adam
Valverde [192]	3D-CNN	2 Conv + 2 Pooling + 1 Dropout + 1 FC	Softmax	CCE	Adadelta
Valverde [175]	Cascade of Two 3D Patch-Wise CNNs	2 Conv + 2 Max Pooling + 2 BN + 1 FC + 1 Dropout	Softmax	CCE	Adadelta

Gessert [170]	Attention-Guided Two-Path CNNs	2 Conv In + 21 ResBlocks + 6 Conv Down + 3 Conv Up + Fusion Block + Conv Out	--	Dice Loss	Adam
Sepahvand [116]	NE SubNet	17 Conv + 7 BN + 3 Max Pooling + 3 De-Conv + 4 Concatenation	Sigmoid	CE	Adam
McKinley [121]	DeepSCAN	2 Conv Blocks + 1 Max Pooling block + 4 Dilated Dense Blocks + 1 Up Sampling	--	Combination of Focal Loss and Label-Flip Loss	--
Ackaouy [122]	Seg-IDOT	6 Conv + 5 Context Modules + 4 Up Sampling + 3 Localization Modules	Softmax	Proposed	Proposed
Maggi [128]	CVSnet	3 Conv + 3 Max Pooling + 3 Dropout + FC	Softmax	CCE	Adam
McKinley [227]	DeepSCAN	2 Conv + 4 Dense Blocks + Max Pooling + Up Sampling	--	Combination of Multi-Class CE Loss and Label-Flip Loss	Adam
HASHEMI [189]	3D Patch-Wise FC-Dense-Net	5 Conv + 3 BN + 11 DenseBlocks + 5 Transition Down + 5 Transition Up + 1 De-Conv + 5 Concatenation	Sigmoid	Asymmetric Loss Functions	Adam
McKinley [171]	DeepSCAN	Cascade of Two CNNs	Softmax	Hybrid Loss	Adam
Vincent [114]	FiLMed-Unet	--	--	Dice Loss	Adam
Vang [130]	Synergy-Net	Fusing U-Net and Mask R-CNN and RPN Sub-Networks	--	Multi-Tasks Loss Function	Adam
Calimeri [193]	Graph Based Neural Networks	Vertex Sequential Fully Connected (vs-FC) + the Graph Sequential Fully Connected (gs-FC) + Dropout	Softmax	--	Adamax
Marzullo [186]	Graph Convolutional Neural Network (GCNN)	1 Graph Conv + FC + Dropout	Softmax	--	Adam
Dai [187]	MDN	Cascading 2 Basic Blocks (Dilated Convolutions, Global and Local Residual Learnings, Concatenation Layers)	--	Proposed Loss Function	Adam
Dewey [183]	DeepHarmony	10 Conv + 8 Strided Conv + 17 BN + 5 Concatenation	--	MAE	Adam
Yoo [161]	Hierarchical Multimodal Fusion (HMF) Model	3 Conv + 3 Max Pooling + 6 FC + 3 RBM + 2 mf-fc + 1 hf-fc + 6 Dropout	Logistic Regression	CE	AdaDelta
Essa [134]	2 Parallel R-CNN	6 Conv + 3 Polling + 2 FC + Softmax	ANFIS	--	--
Hou [148]	Cross Attention Densely-Connected Network (CA-DCN)	3 Cross Attention Block + 12 Conv + 3 Down Sampling + 3 Up Sampling + 8 Concatenation	3 Softmax	Proposed	--
Ulloa [150]	Single-View Multi-Channel (SVMC)	3 Conv + 3 Max Pooling + 4 Dropout + 1 FC	Softmax	CCE	SGD
Zhang [151]	Recurrent Slice-Wise Attention Network (RSANet)	3D U-Net Backbone with RSA Blocks	--	Exponentially Weighted CE	Adam
Naravana [117]	VGG16+FCN	Modified Architecture + 3 FC	Sigmoid	BCE	Adam
Barquero [133]	RimNet (two parallel CNNs inspired by VGGNet)	12 Conv + 6 Max Pooling + 3 BN + 3 FC	Softmax	CE	Adam
Ye [140]	DNN	10 Hidden FC + 10 BN	Softmax	CE	Adam
Fenneteau [167]	3D U-Net	26 Conv + 4 Strided-2 Conv + 30 Instance Normalization + 5 Dropout + 7 Addition + 6 Up-Sampling + 4 Concatenation	Sigmoid	--	Adam
Coronado [119]	3D U-Net	5 Conv + 4 Context Modules + 3 Up Sampling Modules + 2 Localization Modules + 2 Segmentation + 3 Strides + 3 De-Conv + 1 Upscaling	Softmax	Multiclass Weighted Dice	Adam

Narayana [120]	Multiclass U-net	18 Conv + 4 Max Pooling + 4 De-Conv and Up Sampling + 4 Copy and Concatenation	Softmax	Balanced Version of Dice Score Coefficient	SGD
Rosa [123]	Multi-task 3D U-Net + ICD	9 Conv + 2 Max Pooling + 2 Up Sampling + 3 Concatenation	--	Voxel-Wise Weighted CE	Adam
Rosa [124]	3D U-Net	7 Conv + 2 Max Pooling + 2 De-Conv + 2 Concatenation	--	pixel-wise weighted CE	Adam
Narayana [126]	2D U-net	16 Conv + 4 Max Pooling + 4 De-Conv and Up Sampling + 4 Copy and Concatenation	Softmax	Balanced Version of Dice Score Coefficient	Adam
Abolvardi [141]	3D U-Net	19 Conv + 4 Max Pooling + 4 Up Sampling and Conv + 4 Copy and Crop	--	--	--
Falvo [142]	Multimodal Dense U-Net (MDU)	11 Conv + 3 Pooling + 1 Merge and Conv + 2 De-Conv + 6 Dense Blocks + 3 Copy and Concatenation	--	Proposed	Adam
Ghosal [143]	Light-Weighted U-Net	10 Conv + 8 BN + 4 Max Pooling + 4 Up Sampling	Sigmoid	BCE	Adam
Kumar [144]	Modified Dense U-Net	6 Dense Blocks + 3 Max Pooling + 5 Conv + 3 Up Sampling + 3 Concatenation	Softmax	BCE	Adam
Kats [146]	2D U-net based FCNN	6 Conv + 2 Max Pooling + 2 Dropout + 2 De-Conv + 2 Concatenation	Sigmoid	Proposed	--
Feng [147]	3D U-Net	15 Conv + 14 BN + 3 Max Pooling + 3 De-Conv and Up Sampling + 3 Copy and Crop	--	Weighted CE	Adam
Narayana [157]	Multi-Class U-Net	18 Conv + 4 Max Pooling + 3 De-Conv and Up Sampling + 4 Copy and Concatenation	--	Weighted CCE	Adam
Hu [160]	3D Attention Context U-Net (ACU-Net)	2 Conv + 5 3D Context Guided Modules + 2 3D Spatial Attention Blocks + 3 De-Conv + 3 Channel-Wise Concatenation	Softmax	Focal Tversky Loss function	SGD
Gabr [164]	Multiclass U-Net FCNN	18 Conv + 4 Max Pooling + 4 De-Conv and Up Sampling + 4 Copy and Concatenation	--	Multiclass Dice Loss	Adam
Salem [137]	FCNN	3D Registration Architecture + 3D Segmentation Architecture	--	Proposed	Adam
Yoo [177]	Multimodal Deep Learning Network	2 DBNs	RF	--	--
Sujit [145]	Ensemble DL Model	3 Cascaded Networks (Each Cascaded Network Consists of a DCNN Followed by a Fully Connected Network)	Averaging the Quality Scores	BCE	Adam
Finck [115]	DiamondGAN	2 Generators, 2 Discriminators	2 Neuroradiologists	Cycle Consistency Loss Function	--
Wei [125]	Conditional Flexible Self-Attention GAN (two CF-SAGAN used as Sketcher and Refiner)	Generator: 2 Conv + 4 ResDown Blocks + 2 Flexible Self-Attention + 4 ResUp Blocks + 4 Long Connections Discriminator: Conv + 4 ResDown Blocks + 1 Flexible Self-Attention + 1 Dense	Sigmoid	Adversarial Loss Functions	Adam
Shaul [138]	GAN	2 Generator (2 U-Nets), 1 Discriminator	Sigmoid	Proposed	Adam
Zhang [180]	MS-GAN	Multimodal Encoder-Decoder Generator + Multiple Discriminators	--	Proposed	Adam
Wei [182]	Sketcher-Refiner GANs	2 cGANs named Sketcher and Refiner	Softmax	Adversarial Loss Functions	Adam
Wei [185]	Sketcher-Refiner GANs	2 cGANs named Sketcher and Refiner	Softmax	Adversarial Loss	Adam
Hagiwara [224]	Conditional GAN	Generator: 2 Parallel Fully Connected Neural Network Streamlines Discriminator: Similar to The Structure Of U-Net	Sigmoid	Adversarial Loss	Adam
Karaca [166]	SSAE	2 Autoencoders	Softmax	Proposed	--

Vogelsanger [226]	Introspective Variational Autoencoder (intro-VAE or IVAE)	Encoder: Conv + BN + Pooling + Dense + Dropout Decoder: Dense + Dropout + BN + De-Conv + Up Sampling	LDA	Proposed	--
Aslani [118]	Traditional Encoder-Decoder Network with Regularization Network	Encoder Network + Decoder Network + Regularization Network	Softmax	Proposed	Adam
McKinley [191]	Nabla-Net	17 Conv + 16 BN + 3 Max Pooling + 3 UnPooling + Concatenation	Sigmoid	BCE	Adadelta
Krüger [136]	Fully 3D Convolutional Encoder-Decoder Architecture	37 Conv + 5 Up Sampling and Conv + 9 Concatenation + 12 Element Wise Sum + 3 Segmentation + 2 Up Scale	--	CE	Adam
Brosch [174]	Convolutional Encoder Network with Shortcut Connections (CEN-s)	2 Conv + 1 Average Pooling + 2 De-Conv + 1 UnPooling	--	Proposed	Adadelta
Tripathi [139]	CNN-DMRI	3 Conv + 2 Down Sampling + 4 Residual Blocks + 2 De-Conv	--	MSE	Adam
Gessert [113]	Enc-convGRU-Dec	2 Conv + 12 ResBlock + 3 Conv Down + 3 Conv Up + 4 convGRU	--	--	--
Andermatt [131]	MD-GRU	--	Softmax	--	--
Sander [194]	MD-GRU	--	--	--	--