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| **Table 1:** Current ANTsRNet capabilities comprising architectures for applications in image segmentation, image classification, object localization, and image super-resolution. Self-contained examples with data are also provided to demonstrate usage for each of the architectures. Although the majority of neural network architectures are originally described for 2-D images, we generalized the work to 3-D implementations where possible. | | |
| **ANTsRNet** | | |
| **Image Segmentation** | | |
| U-net [23] | (2-D) | Extends fully convolutional neural networks by including an upsampling decoding path with skip connections linking corresponding encoding/decoding layers. |
| V-net [49] | (3-D) | 3-D extension of U-net which incorporates a customized Dice loss function. |
| **Image Classification** | | |
| AlexNet [16] | (2-D, 3-D) | Convolutional neural network that precipitated renewed interest in neural networks. |
| VGG16/VGG19 [17] | (2-D, 3-D) | Also known as ’OxfordNet’. VGG architectures are much deeper than AlexNet. Two popular styles are implemented. |
| GoogLeNet [18] | (2-D) | A 22-layer network formed from *inception blocks* meant to reduce the number of parameters relative to other architectures. |
| ResNet [50] | (2-D, 3-D) | Characterized by specialized *residualized blocks* (and skip connections. |
| ResNeXt [51] | (2-D, 3-D) | A variant of ResNet distinguished by a hyper-parameter called *cardinality* defining the number of independent paths. |
| DenseNet [52] | (2-D, 3-D) | Based on the observation that performance is typically enhanced with shorter connections between the layers and the input. |
| **Object Localization** | | |
| SSD [53] | (2-D, 3-D) | The Multibox Single-Shot Detection (SSD) algorithm for determining bounding boxes around objects of interest. |
| SSD7 [54] | (2-D, 3-D) | Lightweight SSD variant which increases speed by slightly sacrificing accuracy. Training size requirements are smaller. |
| **Image super-resolution** | | |
| SRCNN [55] | (2-D, 3-D) | Image super-resolution using CNNs. |