(a)

Spectra 1DInput

Conv Block 1

Conv Block 2

Den Block 1

Den Block 2

Dense 10

SoftMax

Output

(b)

Conv Block

Conv 1D
(kernel_size=1)

MaxPool
(pool_size=2, stride=2)

BatchNorm

(c)

Den Block

Dense

BatchNorm

Dropout (0.3)

Block	Parameter	Block	Parameter
Conv Block 1	Number of channel=32	Den Block 1	Number of neurons=32
Conv Block 2	Number of channel=16	Den Block 2	Number of neurons=16

Supplementary Figure 1. The concrete architecture of (A) LeNet, (B) Conv block and (c) Den Block.

(a)

Spectra 1DInput

Conv 1D
(64, kernel_size=3, stride=1, padding=1)

BatchNorm

ReLU

Max Pooling
(pool_size=3, stride=2, padding=1)

Dense Block 1+Trans 1

Dense Block 2+Trans 2

Dense Block 3+Trans 3

Dense Block 4

BatchNorm

ReLU

GlobalAveragePool 1D

Dense 10

SoftMax

Output

(b)

Dense Block

BatchNorm

ReLU

Conv 1D
(kernel_size=3, stride=1, padding=1)

BatchNorm

ReLU

Conv 1D
(kernel_size=3, stride=1, padding=1)

BatchNorm

ReLU

Conv 1D
(kernel_size=3, stride=1, padding=1)

BatchNorm

ReLU

Conv 1D
(kernel_size=3, stride=1, padding=1)

(c)

Trans

BatchNorm

ReLU

Conv 1D
(kernel_size=1)

AveragePool
(pool_size=2, stride=2)

Block	Number of channel
Dense Block 1	32
Dense Block 2	32
Dense Block 3	32
Dense Block 4	32
Trans 1	96
Trans 2	112
Trans 3	120

Supplementary Figure 2. The concrete architecture of (A) DenseNet, (B) Dense block and (c) Transition Block. Note: In a Dense Block, the number of channels in all convolution kernels is the same.

(a)

Spectra 2DInput
VGG Block 1
MaxPool2D (pool_size=2, stride=2, padding=1)
VGG Block 2
MaxPool2D (pool_size=2, stride=2, padding=1)
Den Block 1
Den Block 2
Dense 10
SoftMax
Output

(b)

VGG Block

Conv 2D (kernel_size=3, stride=1, padding=1)
BatchNorm
ReLU
Conv 2D (kernel_size=3, stride=1, padding=1)
BatchNorm
ReLU

(c)

Den Block

Dense
BatchNorm
Dropout (0.3)

Block	Parameter	Block	Parameter
Conv Block 1	Number of channel=64	Den Block 1	Number of neurons=32
Conv Block 2	Number of channel=32	Den Block 2	Number of neurons=16

Supplementary Figure 3. The concrete architecture of (A) VGG, (B) VGG block and (c) Den Block.