Multi-branch Deep Learning (MBDL)

OC label
- Condition 1
- Condition 2
- Condition 3

Data preprocessing
(Noise filtering with LSTM-Autoencoder)

Feature Extraction

2D data branch

Global average pooling

AB-LSTM block
c=512

1D data branch

Global average pooling

AB-LSTM block
c=56

Denoised data branch

Global average pooling

AB-LSTM block
c=512

Linear layer

Softmax

Linear layer

Sigmoid

Operational Condition (OC)

Remaining Useful Life (RUL)

RUL label

Health Indicator (HI)

Dropout

K
Q
V

Attention

Linear layer
C

Dropout

ReLU

Linear Layer
C

Dropout

ReLU

LSTM Layer
C

Dropout

ReLU

Motor   Sensor   Signal   Neural
Network

Input vector: [0.1, 0.7, 0.3, 0.2 …]

- To forecast the remaining operational lifespan of a system or component, based on time-series signals

RUL
prediction

Output point: 0.7
→ 70% Remaining Useful Life