

A detailed description of the model structure.

Table S1. Structure of **CnnCrispr** prediction model.

| Layer | Description | Output size |
|---------------------|---|-----------------|
| Embedding | Input size = 16×100 | 23×100 |
| BiLSTM | Units=40 | 23×80 |
| Convolution | Filters=10, kernel size=5 | 19×10 |
| Batch Normalization | | |
| Convolution | Filters=20, kernel size=5 | 15×20 |
| Batch Normalization | | |
| Convolution | Filters=40, kernel size=5 | 11×40 |
| Batch Normalization | | |
| Convolution | Filters=80, kernel size=5 | 7×80 |
| Batch Normalization | | |
| Convolution | Filters=100, kernel size=5 | 3×100 |
| Batch Normalization | | |
| Flatten | | 1×300 |
| Dropout | | |
| Dense | Activation= <i>relu</i> | 1×20 |
| Dropout | | |
| Dense | Activation= <i>softmax</i> (Classification) | 1×2 |
| | Activation= <i>sigmoid</i> (Regression) | 1×1 |

Table S2. Structure of **CnnCrispr_NoLSTM** prediction model.

| Layer | Description | Output size |
|---------------------|---|-----------------|
| Embedding | Input size = 16×100 | 23×100 |
| Convolution | Filters=10, kernel size=5 | 19×10 |
| Batch Normalization | | |
| Convolution | Filters=20, kernel size=5 | 15×20 |
| Batch Normalization | | |
| Convolution | Filters=40, kernel size=5 | 11×40 |
| Batch Normalization | | |
| Convolution | Filters=80, kernel size=5 | 7×80 |
| Batch Normalization | | |
| Convolution | Filters=100, kernel size=5 | 3×100 |
| Batch Normalization | | |
| Flatten | | 1×300 |
| Dropout | | |
| Dense | Activation= <i>relu</i> | 1×20 |
| Dropout | | |
| Dense | Activation= <i>softmax</i> (Classification) | 1×2 |
| | Activation= <i>sigmoid</i> (Regression) | 1×1 |

Table S3. Structure of **CnnCrispr_Conv_LSTM** prediction model.

| Layer | Description | Output size |
|---------------------|---|-------------|
| Embedding | Input size = 16×100 | 23×100 |
| Convolution | Filters=10, kernel size=5 | 19×10 |
| Batch Normalization | | |
| Convolution | Filters=20, kernel size=5 | 15×20 |
| Batch Normalization | | |
| Convolution | Filters=40, kernel size=5 | 11×40 |
| Batch Normalization | | |
| Convolution | Filters=80, kernel size=5 | 7×80 |
| Batch Normalization | | |
| Convolution | Filters=100, kernel size=5 | 3×100 |
| Batch Normalization | | |
| BiLSTM | Units=40 | 3×80 |
| Flatten | | 1×240 |
| Dropout | | |
| Dense | Activation= <i>relu</i> | 1×20 |
| Dropout | | |
| Dense | Activation= <i>softmax</i> (Classification) | 1×2 |
| | Activation= <i>sigmoid</i> (Regression) | 1×1 |

Table S4. Structure of **CnnCrispr_NoBatchNor** prediction model.

| Layer | Description | Output size |
|-------------|---|-------------|
| Embedding | Input size = 16×100 | 23×100 |
| BiLSTM | Units=40 | 23×80 |
| Convolution | Filters=10, kernel size=5 | 19×10 |
| Convolution | Filters=20, kernel size=5 | 15×20 |
| Convolution | Filters=40, kernel size=5 | 11×40 |
| Convolution | Filters=80, kernel size=5 | 7×80 |
| Convolution | Filters=100, kernel size=5 | 3×100 |
| Flatten | | 1×300 |
| Dropout | | |
| Dense | Activation= <i>relu</i> | 1×20 |
| Dropout | | |
| Dense | Activation= <i>softmax</i> (Classification) | 1×2 |
| | Activation= <i>sigmoid</i> (Regression) | 1×1 |

Table S5. Structure of **CnnCrispr_NoDropout** prediction model.

| Layer | Description | Output size |
|---------------------|---------------------------|-------------|
| Embedding | Input size = 16×100 | 23×100 |
| BiLSTM | Units=40 | 23×80 |
| Convolution | Filters=10, kernel size=5 | 19×10 |
| Batch Normalization | | |

| | | |
|---------------------|---|-------|
| Convolution | Filters=20, kernel size=5 | 15×20 |
| Batch Normalization | | |
| Convolution | Filters=40, kernel size=5 | 11×40 |
| Batch Normalization | | |
| Convolution | Filters=80, kernel size=5 | 7×80 |
| Batch Normalization | | |
| Convolution | Filters=100, kernel size=5 | 3×100 |
| Batch Normalization | | |
| Flatten | | 1×300 |
| Dense | Activation= <i>relu</i> | 1×20 |
| Dense | Activation= <i>softmax</i> (Classification) | 1×2 |
| | Activation= <i>sigmoid</i> (Regression) | 1×1 |