

| Methods        | CIDEr        | SPICE        | BLEU-1      | BLEU-2      | BLEU-3      | BLEU-4       | METEOR      | ROUGE-L      |
|----------------|--------------|--------------|-------------|-------------|-------------|--------------|-------------|--------------|
| Hard-attention | -            | -            | 71.8        | 50.4        | 35.7        | 25.0         | 23.0        | -            |
| Soft-attention | -            | -            | 70.7        | 49.2        | 34.4        | 24.3         | 23.9        | -            |
| VAE            | 90.0         | -            | 72.0        | 52.0        | 37.0        | 28.0         | 24.0        | -            |
| ATT-FCN        | -            | -            | 70.9        | 53.7        | 40.2        | 30.4         | 24.3        | -            |
| Att-CNN+RNN    | 94.0         | -            | 74.0        | 56.0        | 42.0        | 31.0         | 26.0        | -            |
| SCN-LSTM       | 101.2        | -            | 72.8        | 56.6        | 43.3        | 33.0         | 25.7        | -            |
| Adaptive       | 108.5        | -            | 74.2        | 58.0        | 43.9        | 33.2         | 26.6        | -            |
| SCA-CNN        | 95.2         | -            | 71.9        | 54.8        | 41.1        | 31.1         | 25.0        | 53.1         |
| SCST-Att2all   | 114.0        | -            | -           | -           | -           | 34.2         | 26.7        | 55.7         |
| LSTM-A         | 100.2        | 18.6         | 73.4        | 56.7        | 43.0        | 32.6         | 25.4        | 54.0         |
| DRL            | 93.7         | -            | 71.3        | 53.9        | 40.3        | 30.4         | 25.1        | 52.5         |
| Skeleton Key   | 106.9        | -            | 74.2        | 57.7        | 44.0        | 33.6         | 26.8        | 55.2         |
| CNNL+RHN       | 98.9         | -            | 72.3        | 55.3        | 41.3        | 30.6         | 25.2        | -            |
| TD-M-ATT       | 111.6        | -            | 76.5        | 60.3        | 45.6        | 34.0         | 26.3        | 55.5         |
| ATTN+C+D(1)    | 114.25       | <b>21.05</b> | -           | -           | -           | <b>36.14</b> | 27.38       | <b>57.29</b> |
| Ours-baseline  | 112.7        | 20.0         | 79.7        | 62.2        | 47.1        | 35.0         | 26.7        | 56.4         |
| Ours-SR-FL     | 114.6        | 20.5         | 79.8        | 62.3        | 47.1        | 34.9         | 27.1        | 56.6         |
| Ours-SR-PL     | <b>117.1</b> | 21.0         | <b>80.1</b> | <b>63.1</b> | <b>48.0</b> | 35.8         | <b>27.4</b> | 57.0         |