# Korean Bio-Medical Corpus (KBMC) for Medical Named Entity Recognition

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## Bio-medical Named Entity Recognition

-NER contributes to processing medical terminology. Medical NER enables language models to identify and process medical terminologies and jargon.
-NER facilitates information extraction from unstructured data.

| Index | Token | Translation | Label |
|---|---|---|---|
| 1 | 간질 | Interstitial | B-Disease |
| 2 | 폐렴 | pneumonia | I-Disease |
| 3 | 은 | *(particle)* is | O |
| 4 | 간 | liver | B-Body |
| 5 | 과 | and | O |
| 6 | 폐 | lung | B-Body |
| 7 | 의 | of | O |
| 8 | 역할 | function | O |
| 9 | 이 | *(particle)* is | O |
| 10 | 저하 | deteriorated | O |
| 11 | 되어 | has | O |
| 12 | ··· | ··· | ··· |

6,150 sentences, 153,971 tokens in total

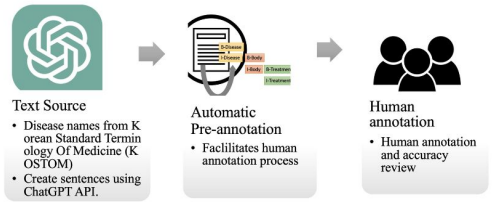
| | | | |
|---|---|---|---|
| 12 | ··· | ··· | ··· |
| 1 | 치료 | treatments | O |
| 2 | 는 | *(particle)* are | O |
| 3 | 항암제 | anticancer drug | B-Treatment |
| 4 | 치료 | treatment | I-Treatment |
| 5 | , | , | O |
| 6 | 방사선 | radiation | B-Treatment |
| 7 | 치료 | therapy | I-Treatment |
| 8 | , | , | O |
| 9 | 골수 | bone marrow | B-Treatment |
| 10 | 이식 | transplantation | I-Treatment |
| 11 | 등 | etc | O |
| 12 | 이 | *(particle)* are | O |
| 13 | 있으며 | There (are) | O |
| 14 | ··· | ··· | ··· |

| Named Entity (NE) | Scheme | # of NE |
|---|---|---|
| Disease | B (Begin) | 10,595 |
| | I (Inside) | 10,089 |
| Body | B (Begin) | 5,215 |
| | I (Inside) | 1,158 |
| Treatment | B (Begin) | 1,193 |
| | I (Inside) | 839 |

Label Distribution of KBMC

## KBMC (Korean Bio-Medical Corpus)

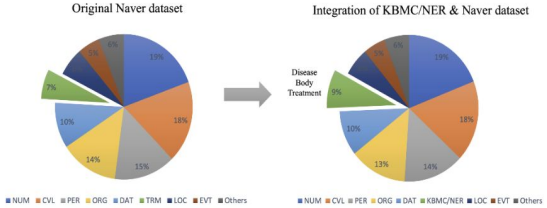
The first open-source medical NER dataset for Korean.




Construction Process of KBMC

## Data Application

The distribution of Named Entity labels in two datasets: the original Naver NER dataset (left), and a combined version of the Naver NER dataset (partial)




For data augmentation and comparison of NER in general and domain-specific text, the Naver NER dataset is concatenated with KBMC. The concatenated version includes 13 general Named Entities and 3 medical Named Entities.

## Experiment

| Model | Avg.F1(General) | medical NE | F1 of medical NER |
|---|---|---|---|
| KM-BERT (Kim et al., 2022) | 87.08 | TRM | 75.35 |
| KR-BERT (Lee et al., 2020b) | 86.51 | TRM | 75.26 |
| Ko-BERT | 88.01 | TRM | 78.21 |
| KR-ELECTRA (Lee and Shin, 2022) | 87.62 | TRM | 76.25 |
| Ko-ELECTRA | 88.00 | TRM | 76.58 |
| BiLSTM-CRF (Huang et al., 2015) | 55.23 | TRM | 42.23 |

Medical Named Entities and NER Performance: General NER dataset (The Naver Dataset) solely used.

| Model | Avg.F1(General) | Medical NEs | F1 of Medical NER |
|---|---|---|---|
| KM-BERT | 88.53 (+1.45) | Disease | 98.04 (+22.69) |
| | | Body | 98.13 (+22.78) |
| | | Treatment | 98.53 (+23.18) |
| KR-BERT | 87.48 (+0.97) | Disease | 98.04 (+22.78) |
| | | Body | 98.32 (+23.06) |
| | | Treatment | 97.82 (+22.56) |
| KoBERT | 88.70 (+0.69) | Disease | 98.25 (+20.04) |
| | | Body | 98.22 (+20.01) |
| | | Treatment | 98.18 (+19.97) |
| KR-ELECTRA | 88.63 (+1.01) | Disease | 98.21 (+21.96) |
| | | Body | 98.31 (+22.06) |
| | | Treatment | 98.53 (+22.28) |
| KoELECTRA | 88.86 (+0.86) | Disease | 98.05 (+21.47) |
| | | Body | 97.72 (+21.14) |
| | | Treatment | 96.56 (+19.98) |
| BiLSTM-CRF | 56.68 (+1.45) | Disease | 88.18 (+45.95) |
| | | Body | 81.44 (+39.21) |
| | | Treatment | 61.14 (+18.91) |

Medical Named Entities and Performance: KBMC applied. F1 scores for medical entities are nearly 20 points higher than the TRM label.

The Naver dataset contains the label TRM (Term) representing both medical and IT-related terms.

In the concatenated dataset, sentences that include TRM from the original dataset have been replaced with KBMC for more accurate classification of medical terms into refined categories.

## KBMC Applicability Assessment

| | Avg.F1 | Precision | Recall |
|---|---|---|---|
| MedSpaCy | 95.69 | 97.02 | 95.52 |

KBMC demonstrates remarkable performance on a clinical text processing toolkit in Python, MedSpaCy as well.

## Conclusion

KBMC enables language to recognize a broader spectrum of medical terms, enhancing their understanding and processing of clinical texts.

**Contributions**:
- We describe and publicly release Korean Bio-Medical Named Entity Recognition Corpus (KBMC), the first open-source Korean medical NER dataset. This contributes to solving the data scarcity problem.
- Crucial role in medical data processing. Medical NER would facilitate the sensitive data anonymization process and contribute to the reconstruction of medical data that lack standardized formats.

### Selected References

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