Kaohsiung Medical University Chung-Ho Memorial Hospital

From Text to Code: Predicting Abbreviated Injury Scale 2015 from Clinical Narratives

Chien-Ming Lee, Pei-Ling Lee, Chia-Yeuan Han, Joffrey Hsu, Chuan-Yu Hu

1030574@kmuh.org.tw

Kaohsiung Medical University Chung-Ho Memorial Hospital, Kaohsiung Medical University

About the Presenter

Chien-Ming Lee
1030574@kmuh.org.tw

- Engineer with extensive experience in system and software development
- Research interests: AI, Medical Informatics, Data Processing
- Professional skills: C#, Web development, Android app development
- Currently engaged in AI-assisted healthcare research projects
- Dedicated to bridging engineering and medical applications

Background

AIS 2015 Coding System

The Abbreviated Injury Scale is a global standard for classifying trauma injuries and assessing severity accurately.

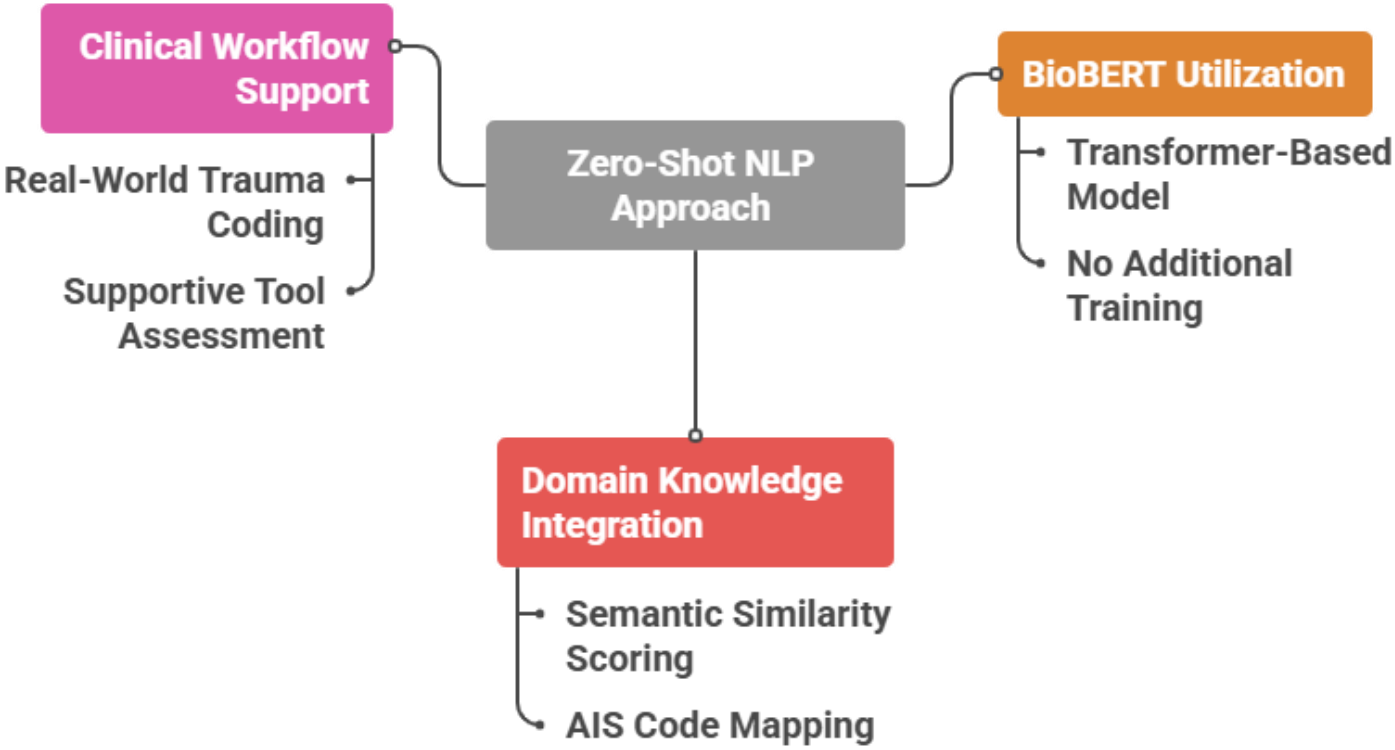
Manual Coding Challenges

Manual AIS coding is time-consuming and error-prone, especially under the pressure of emergency department settings.

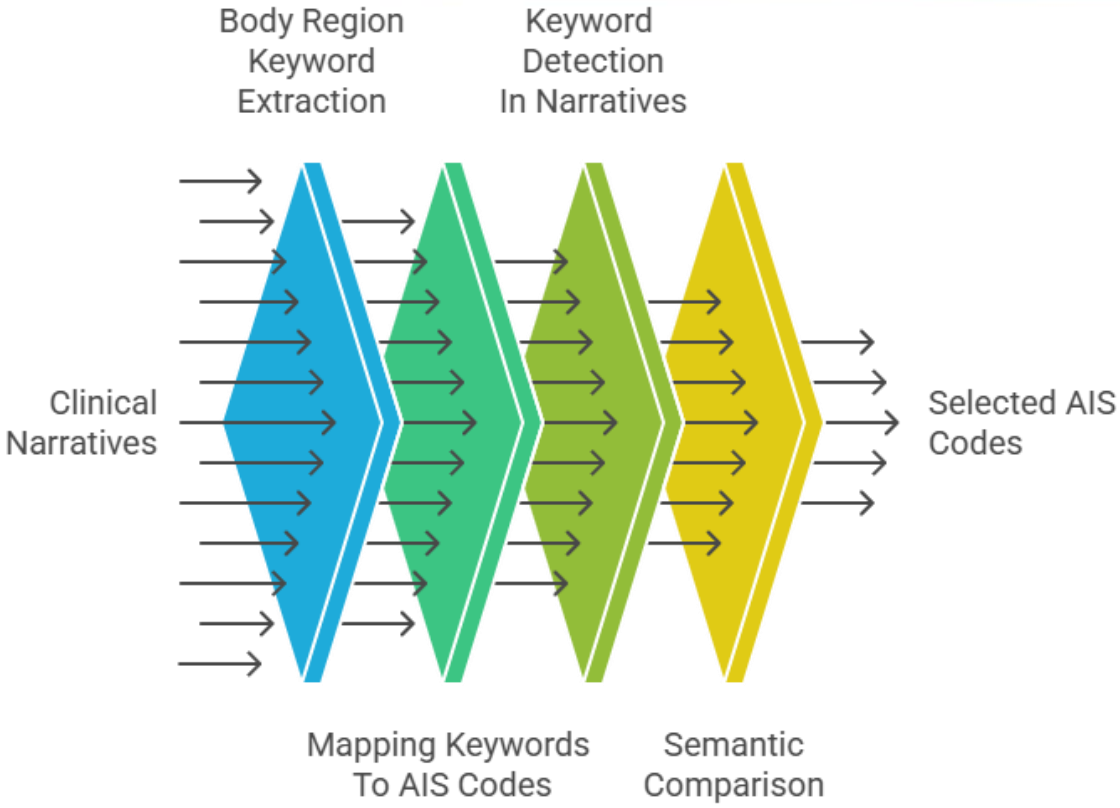
NLP-based Automation

Advances in NLP with transformer models offer potential to automate AIS coding by interpreting complex clinical texts.

Research Objective



Overview of the Prediction Pipeline



Method Steps

Step 1: Body Region Keyword Extraction

Extract anatomical keywords from AIS descriptions (e.g., skull, thorax, femur). Add different forms to these keywords, such as adjectives, plurals.

Step 2: Mapping Keywords To AIS Codes

Map identified body region keywords to AIS codes in a many-to-many table associating keywords with several candidate AIS codes.

Step 3: Keyword Detection In Narratives

Scan unstructured diagnostic narratives to find relevant anatomical keywords that relate to body regions. Use detected keywords to filter candidate AIS codes from a mapping table for precise code selection.

Step 4: Semantic Comparison

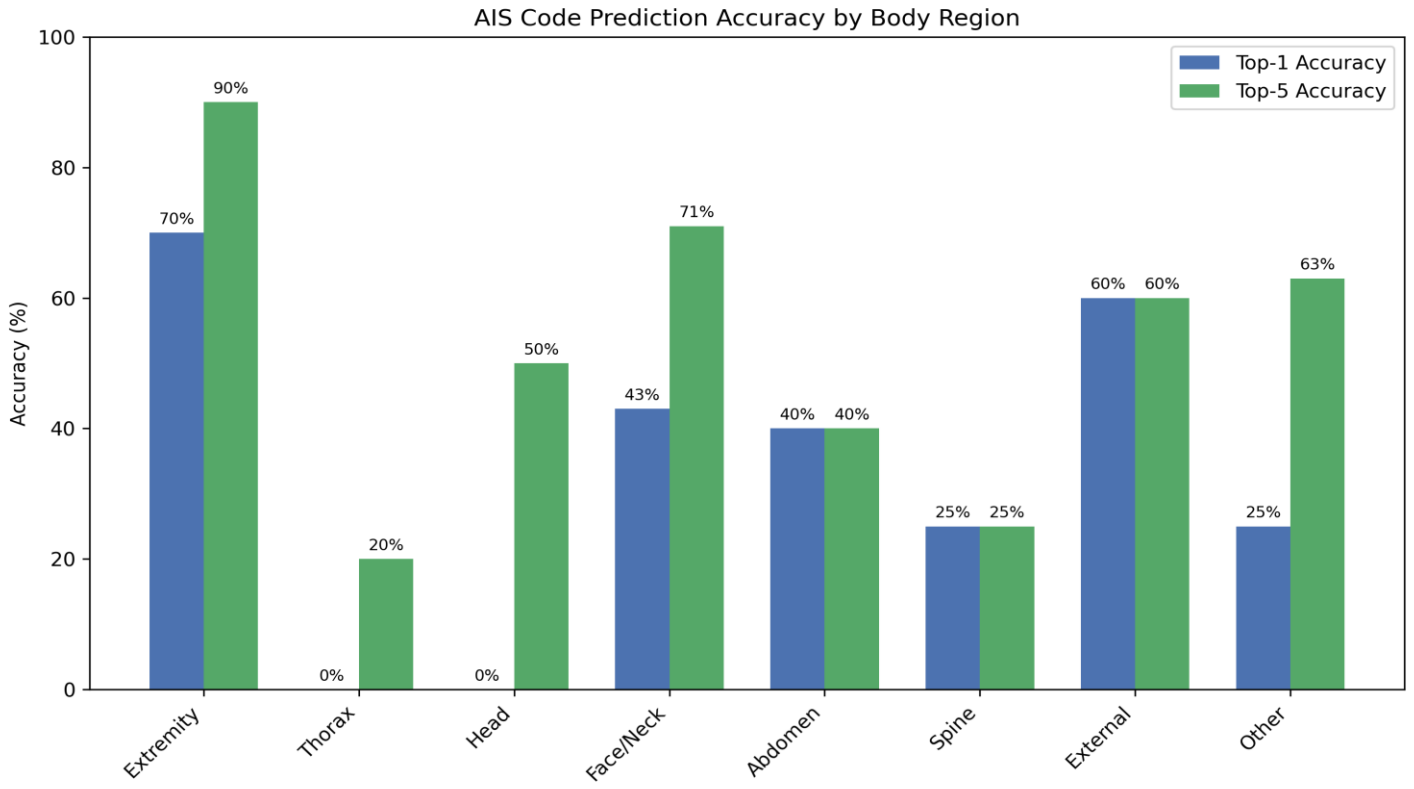
Compute semantic similarity between diagnostic text and AIS code descriptions using BioBERT.

Results

- Dataset: 54 cases analyzed across all body regions
  - Top-1 accuracy: 35.2% (19 hits)
  - Top-5 accuracy: 55.6% (30 hits)

- Highest Performance Region:
  - **Extremity Injuries**: Showed the best result due to consistent terminology.
    - Top-1 Accuracy: **70%** (7/10)
    - Top-5 Accuracy: **90%** (9/10)

Precision Accuracy



Discussion & Limitation

Accuracy Variation by Region

Highest accuracy for extremity injuries due to consistent clinical terminology and lowest for thoracic injuries because of complex descriptions.

Keyword Mapping Limitations

Keyword-based mapping narrowed candidate codes but was sensitive to synonym variations and misspellings, causing potential missed detections.

Single Code Prediction Constraint

Predict only one AIS code per diagnosis, limiting effectiveness in cases with multiple injuries requiring multiple codes.

Model without Fine-Tuning

Model performance varies due to lack of fine-tuning and dependency on physician wording in narratives.

Conclusion & Future Work

Zero-shot NLP Feasibility

Effectively predicts AIS 2015 codes from unstructured clinical narratives without labeled training data.

Methodology Highlights

Combining anatomical keyword detection semantic similarity scoring using BioBERT NLP model enables accurate mapping of free-text entries.

Future Enhancements

Aim to expand datasets, improve synonym handling, contextual interpretation, and integrate structured clinical data.

Long-term Impact

Such systems could improve efficiency, accuracy, and consistency in trauma registry data collection in clinical settings.

References

- [1] Association for the Advancement of Automotive Medicine, "The Abbreviated Injury Scale 2015 Revision." Chicago, IL, USA: AAAM,2025.

- [2] J. Lee, et al., "BioBERT: a pre-trained biomedical language representation model for biomedical text mining," Bioinformatics, vol. 36, no. 4, pp.1234–1240, Feb. 2020.DOI: https://doi.org/10.1093/bioinformatics/btz682

- [3] P. Deka, BioBERT-mnli-snli-scinli-scitail-mednli-stsb, Hugging Face,2021. [Online]. Available: https://huggingface.co/pritamdeka/BioBERT-mnli-snli-scinli-scitail-mednli-stsb. [retrieved: April, 2025.] Licensedunder Creative Commons Attribution-Non Commercial 3.0 (CC BY-NC3.0). See https://spdx.org/licenses/CC-BY-NC-3.0.

Kaohsiung Medical University Chung-Ho Memorial Hospital

Thank You!