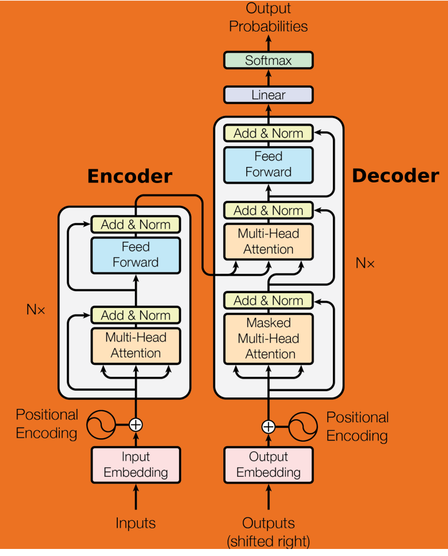
Predicting hospital readmission with long clinical notes

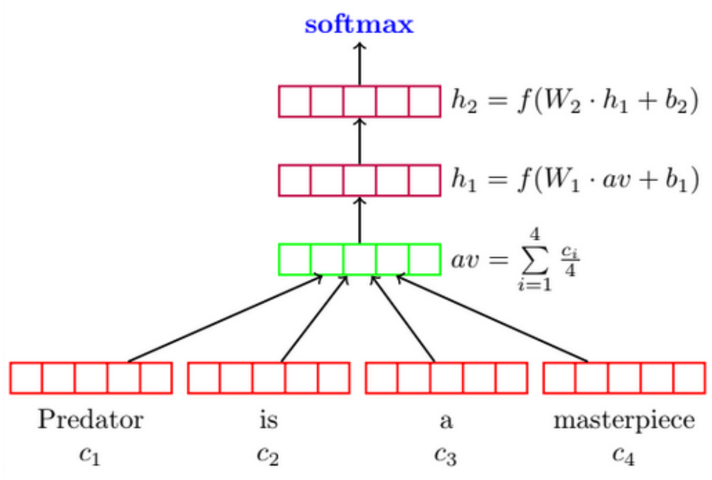


Unplanned hospital readmission Occurs when a patient is discharged form a hospital and later is admitted again. It contributes to unfavorable patient clinical outcomes and high healthcare costs. Readmission prediction can aid healthcare providers in deciding if a patient is ready for discharge. The project aims to improve the performance of a transformer based model by using Longformer [1].

MIMIC-III Dataset

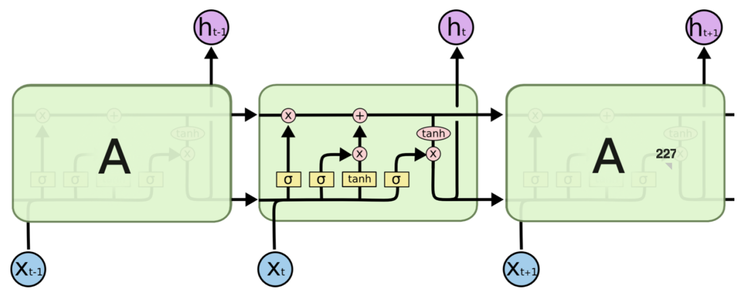
MIMIC-III [5] integrates deidentified, comprehensive clinical data of patients admitted to critical care units.

Deep Averaging Network



The Deep Averaging Network (DAN) [4] Uses the average embedding of all tokens to represent a note.

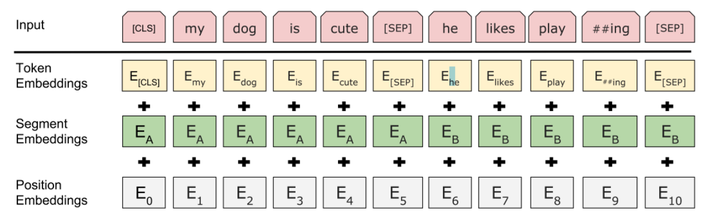
Long short-term memory



A gated recurrent neural network. An LSTM [3] unit is composed of a cell, an input gate, an output gate and a forget gate.

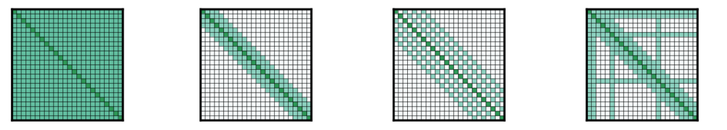
BERT

Bidirectional Encoder Representations from Transformers (BERT) [2], is designed to pre-train deep bidirectional representations from unlabeled text.



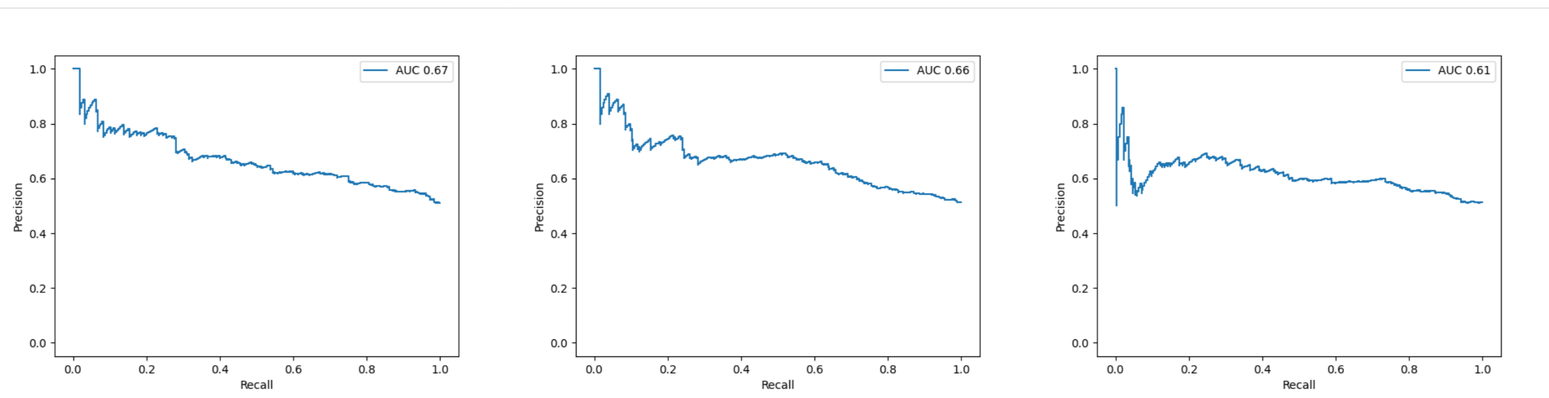
Longformer

Longformer [1] is a drop-in replacement for the transformer self-attention with linear complexity, making it possible to work with longer sequences.



(a) Full n^2 attention (b) Sliding window attention (c) Dilated sliding window (d) Global+sliding window

Current Results



(a) BERT (b) LSTM (c) DAN

Model	BERT	LSTM	DAN
AUC	0.67	0.66	0.61

References

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[2] J. Devlin, M. W. Chang, K. Lee, and K. Toutanova. BERT: Pre-training of deep bidirectional transformers for language understanding. In *NAACL HLT 2019 - 2019 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies - Proceedings of the Conference*, volume 1, pages 4171–4186, 2019.

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[4] M. Iyyer, V. Manjunatha, J. Boyd-Graber, and H. Daumé III. Deep unordered composition rivals syntactic methods for text classification. In *Proceedings of the 53rd Annual Meeting of the Association for Computational Linguistics and the 7th International Joint Conference on Natural Language Processing (Volume 1: Long Papers)*, pages 1681–1691, Beijing, China, July 2015. Association for Computational Linguistics.

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