

MEGREC: A HETEROGENEOUS EHR FUSION FRAMEWORK FOR EXTREME MULTI-LABEL SPECIALTY RECOMMENDATION AND EXPLANATION



Author(s): G. Venkata Ramana Reddy¹, T. Bhaskara Reddy²

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Abstract:

MEGRec addresses retrospective specialty or service label ranking from heterogeneous electronic health record inputs. Clinical text, demographic variables, and temporal-location features are encoded and fused through an attention-based representation, followed by a hierarchical extreme multi-label classifier over $M=250$ labels. Evaluation on the MIMIC-III benchmark reports $P@10=90.7\%$, $R@10=87.6\%$, $F1@10=89.1\%$, $NDCG@10=89.5\%$, and $\text{Macro-AUC}=94.5\%$, with lower training and inference cost than XMC and MUFIN under the reported setup. An explanation module combines modality-level attention and medical concept mapping to generate case-level rationales. Qualitative examples and limited clinician feedback indicate that the generated explanations are clinically plausible, but the explanation evidence remains preliminary because the human evaluation is small and non-comparative. The study therefore presents a scalable proof-of-concept for explainable specialty label ranking from multi-source EHR data under a large output space.

Keywords:

Heterogeneous EHR Fusion, Extreme Multi-label Classification, Explainable AI, ClinicalBERT, Attention Fusion, Clinical Decision Support, Specialty Label Ranking, Hierarchical Classification

For full paper, contact:

Prof Muhammad Imran Aslam

Editor-in-Chief, NED University Journal of Research

Ph: +92 (21) 99261261-8 Ext:2670; Fax: +92 (21) 99261255

Email: NED-Journal@neduet.edu.pk

Website: <http://www.neduet.edu.pk/NED-Journal>

¹ Research Scholar, Department of Computer Science & Technology, Sri Krishnadevaraya University, Ananthapuramu, Andhra Pradesh, India, Ph. +9154057823, Email: gvreddy@gmail.com

² Professor, Department of Computer Science & Technology, Sri Krishnadevaraya University, Ananthapuramu, Andhra Pradesh, India, Ph. +9440386090, Email: bhaskarreddy.sku@gmail.com