

Goal

To develop an interoperable platform that enables the use of CDM-derived prediction models to evaluate patients in real-time using transactional non-CDM based EMR systems.

Background

Statistical prediction models have been developed for predicting risk of adverse drug events [1, 2] using observational data such as electronic health records (EHR) to assist clinical decision-making and improve patient safety.

There are clinical decision support systems equipped with prediction models to estimate survival [3] and risk of adverse events [3] based on individual patient data; however, these systems can only work with the specified data model within the system.

In this project, we are introducing an interoperable platform to implement prediction models that continuously delivers personalized risk predictions based on incoming individual HL7 CDA messages from different EHR systems with different data structures.

Methods

The platform [Figure 1] includes:

1. Message receiver
2. Extract-Transform-Load (ETL) engine
3. Analytics module
4. User interface

The “message receiver” delivers an HL7 CDA message (e.g., Continuity of Care Document) from an external system to a custom ETL module that converts the data to the OMOP common data model (CDM) v5 standard.

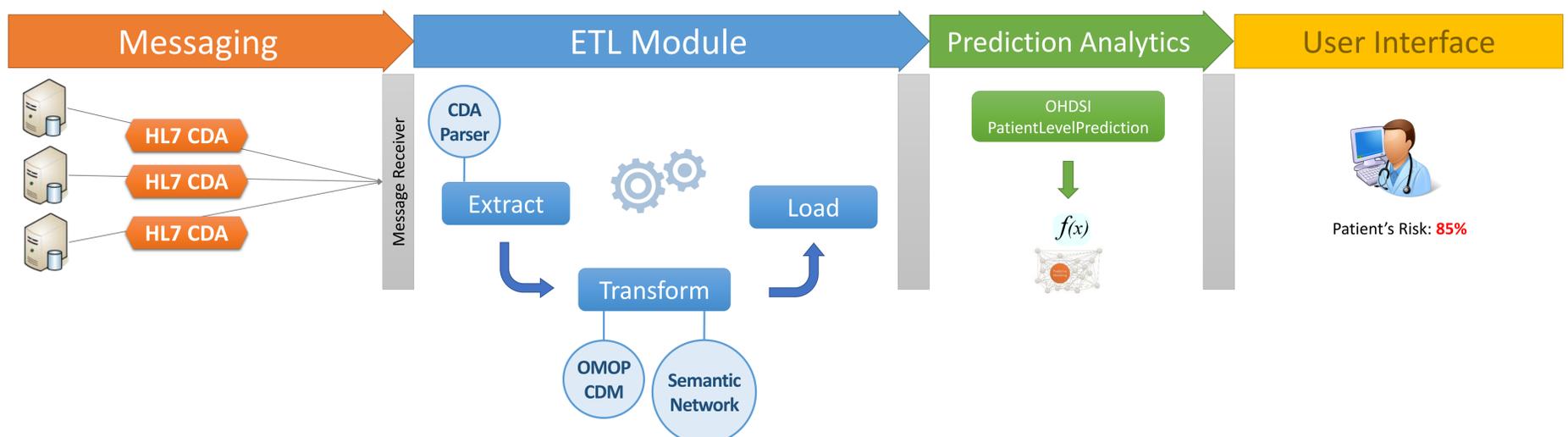
The “ETL component” uses a CDA parser to extract data elements from HL7 CDAs and transforms the data using OMOP CDM and vocabularies (e.g., LOINC, SNOMED CT).

The resulting data are passed to a pre-computed prediction model, such as that generated by the OHDSI PatientLevelPrediction R package to estimate outcome risk.

The predictive model would, of course, differ for different exposures and outcomes but the process would remain the same.

As a final step, the estimated risk will be shown to the care provider through a user interface.

Figure 1. A schematic model of the proposed platform



Conclusion

We expect the proposed platform will provide an interoperable infrastructure to use CDM-based predictive models in real-time settings using a diversity of EMR systems.

References

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2. Overby CL, Pathak J, Gottesman O, Haerian K, Perotte A, Murphy S, et al. A collaborative approach to developing an electronic health record phenotyping algorithm for drug-induced liver injury. *Journal of the American Medical Informatics Association : JAMIA*. 2013;20(e2):e243-52.
3. Montgomery AA, Fahey T, Peters TJ, MacIntosh C, Sharp DJ. Evaluation of computer based clinical decision support system and risk chart for management of hypertension in primary care: randomised controlled trial. *BMJ (Clinical research ed)*. 2000;320(7236):686-90.