# Unified Diagnoses with M3H for the Heart

## HAIM Project 2 Extended

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# Project Scope

## Predict Development of Cardiac Diseases from EKG and Basic Medical Data

### STATUS QUO

Physician detects an anomaly → **Further Examinations**

Physician doesn't detect anomalies → **No action taken**

#### Pain Points

→ **physicians are not cardiologists** - they may miss some information

→ detecting risk of heart diseases requires **expensive** and **time consuming** exams

### WITH THIS MODEL

Model processes EKG + patient's medical information → **Detects risk of heart diseases in real time**

#### Potential Impact

→ **Maximise amount of information** extracted from simple EKG

→ Reduce **time elapsed between EKG and diagnosis**
→ Overall **shorten the heart disease diagnosis pipeline**

# Project Outline

**Tabular data:**

- Demographics
- Past Medications
- Past Procedures
- Past Diagnoses

**Timeseries data:**

- EKG - features extracted with tsfreshs

**INPUT**

**MULTIMODAL + MULTITASK**

**M3H**
framework

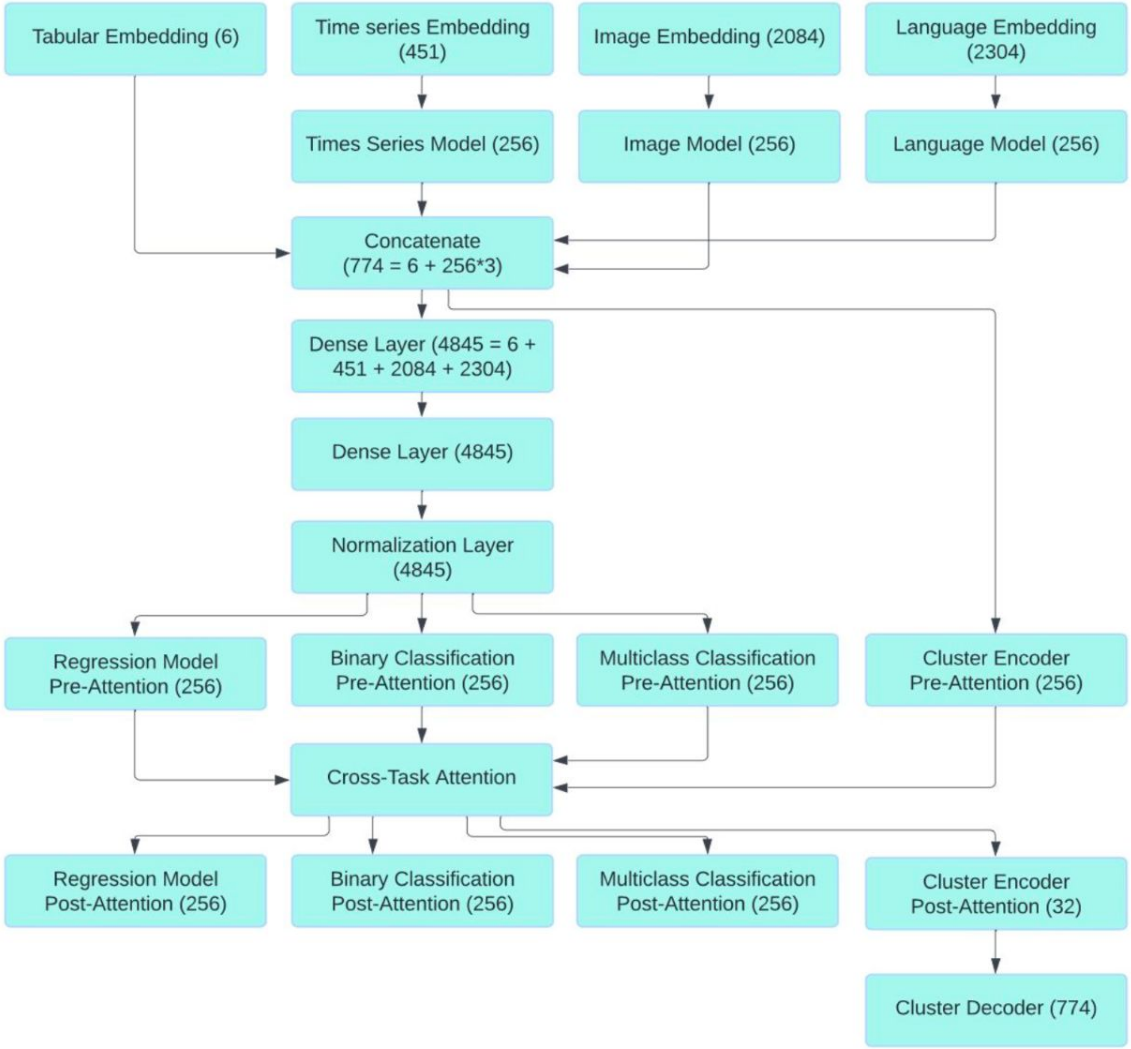
**Target(s):**

- Hypertrophic cardiomyopathy
- Atrial fibrillation
- Ventricular tachycardia
- …
- Left Ventricular Ejection Fraction
- Heart Failure

List of diseases provided by cardiologists

**OUTPUT**

# **Original** M3H Framework



# Preliminary Tests **Results**

| | | LVEF(t)_mult | | | I48(t)_bin | | |
|---|---|---|---|---|---|---|---|
| **Data** | **Tasks(s)** | **Test score** | **Bootstrap mean** | **Bootstrap s.d.** | **Test score** | **Bootstrap mean** | **Bootstrap s.d.** |
| Tabular only | LVEF(t)_mult | 0.60 | 0.60 | **0.01** | - | - | - |
| | I48(t)_bin | - | - | - | 0.73 | 0.73 | **0.006** |
| | LVEF(t)_mult, I48(t)_bin | **0.62** | **0.63** | 0.02 | **0.74** | **0.74** | 0.009 |