Learning to Trust AI Models in Cardiology

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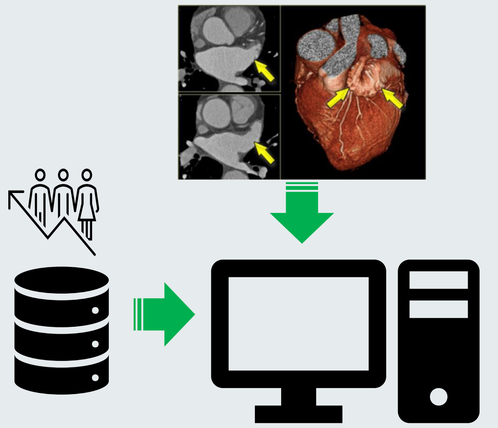
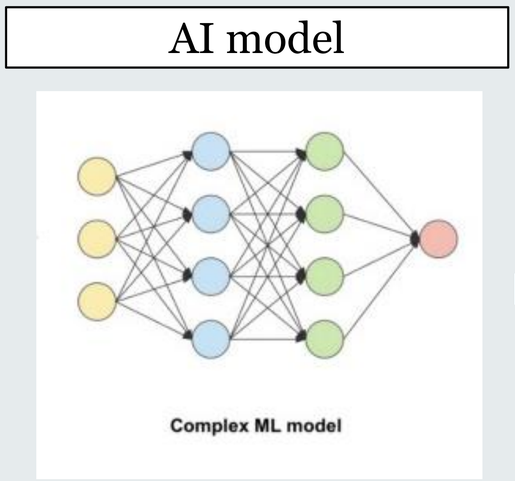
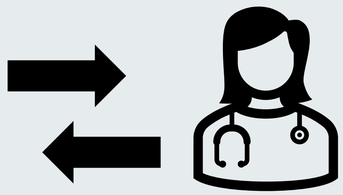




Outcome	Confidence
Time (months/years)	90%
	75%
	80%



Multimodal Data

Aim:

Develop an artificial intelligence (AI) decision support tool that can use big data to assist cardiologists in making better decisions about treating heart failure (HF) patients.

Introduction:

- Currently, there are around 160,000 deaths each year related to heart and circulatory diseases in the UK, with more than 900,000 currently living with HF [1]. Predicting the survival outcomes for these HF patients can provide a valuable tool to identify biomarkers that can influence their prognostic outcomes.
- Artificial intelligence (AI) may be used as a decision support tool to develop a survival prediction model for HF patients leveraging on large repositories of available data such as the UK biobank and GSTT clinical databases.
- Application of AI based tools have yet to be fully utilised in healthcare facilities, and one reason for this is, is the lack of trust in automated predictions for clinical applications [2].

Survival Prediction

Goal:

Develop a HF survival prediction decision tool that incorporates interpretability methods to facilitate and develop trust in AI models, to create transparency by explaining automated decisions.

Methods:

Data collection:
The interpretability methods and survival model will be built using an existing well curated database of HF patients and CRT outcomes [3].
A larger database will be used to build the final survival prediction model, once available.

Data analysis:

1. Develop interpretability and uncertainty measures for an existing prediction model for CRT response [3].
2. Design and develop a multimodal predictive CRT response and survival model using both image and clinical biomarkers.
3. Create a trustworthy HF prediction model incorporating methods 1 and 2, using a larger HF cohort (data dependent).

Conclusions :

A predictive AI heart failure survival model combined with interpretability and uncertainty metrics to estimate the confidence in predictions will be developed, to create a transparent and trustworthy clinical decision support tool that can be used in practice.

References :

[1]BHF, UK Factsheet March 2021
[2]Explainable AI: A Review of Machine Learning Interpretability Methods Linardatos, P et al (2020)
[3]Interpretable Deep Models for Cardiac Resynchronisation Therapy Response (CRT) Prediction Esther Puyol-Anton et al (2020)