

Motivation

- Lots of different sensors available
- Can provide possibly contradictory information
- Need to handle this contradictory information and the resulting conflicting actions
- EHealth applications mainly focus on one sensor

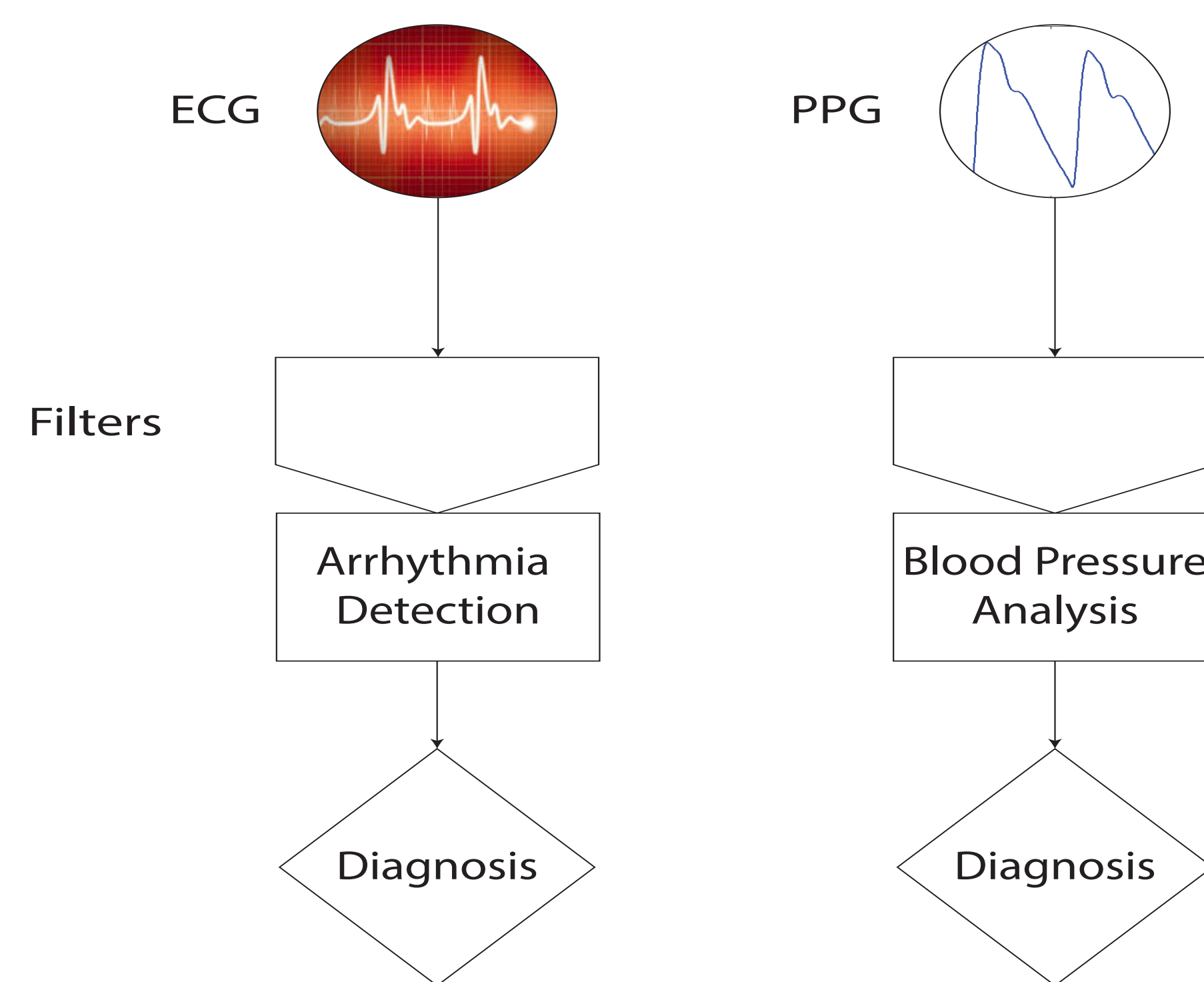


Figure 1: Previous EHealth Systems

Existing Work

- Rule-based system developed by my supervisor [1]
- An application for wearable devices helping with the rehabilitation of cardiac patients [2]

Objectives

- 1) Adapt and train Hidden Markov Models to analyse the data coming from different sensors.
- 2) Use the analysis from the Hidden Markov Models in combination with a rule based system in order to :
 - Detect conflicting information or actions
 - Resolve the conflicts detected
 - Use past data and decisions in order to avoid conflicts before they happen.

Proposed Structure

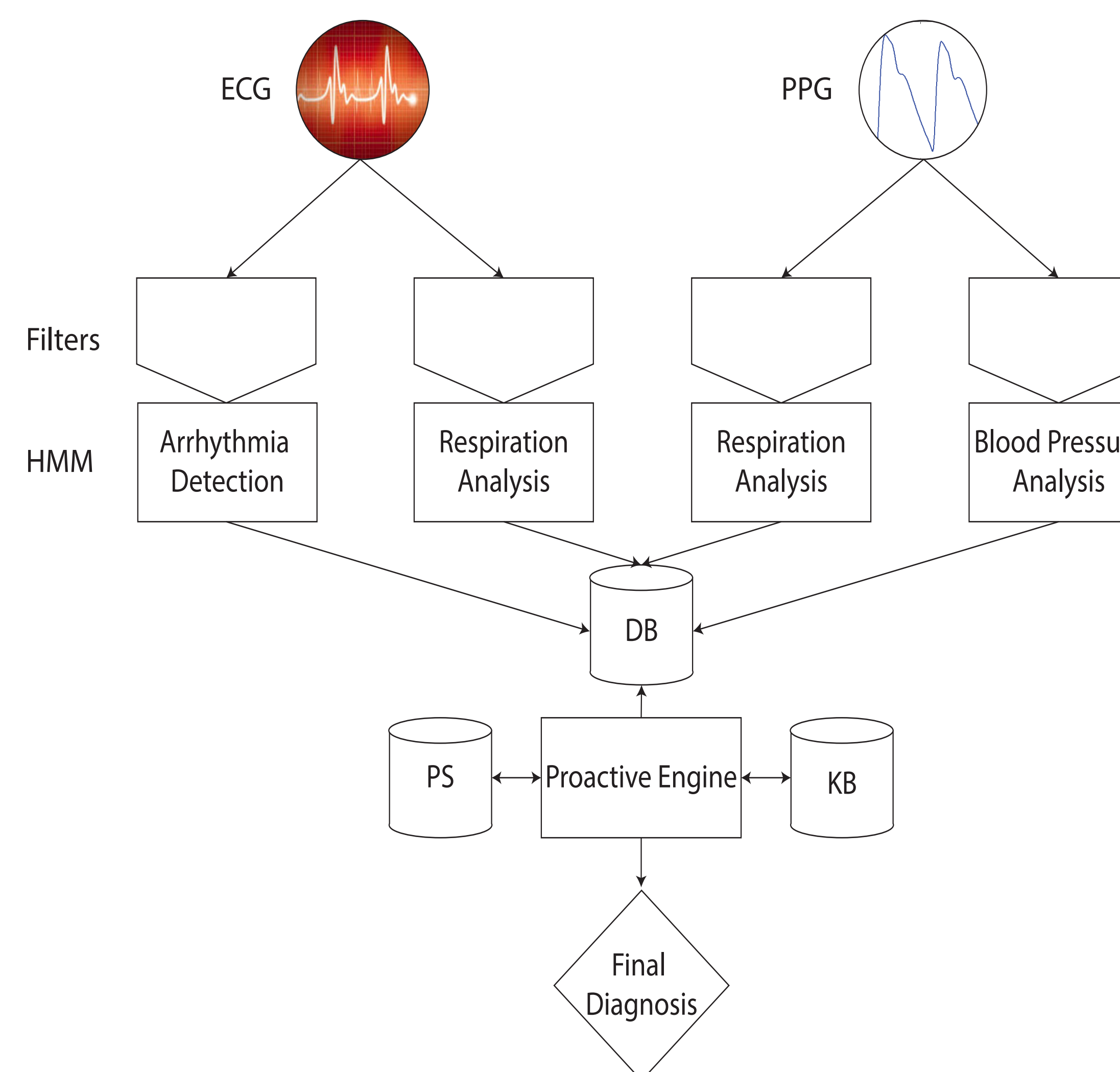


Figure 2: Proposed Structure

Preliminary Tests

- Tests done on ECG leads from the MGH/MF Waveform Database [3]
- 3 types of heartbeats: Normal, Supraventricular and Ventricular
- Early Results: Good Recall but also High FP rate

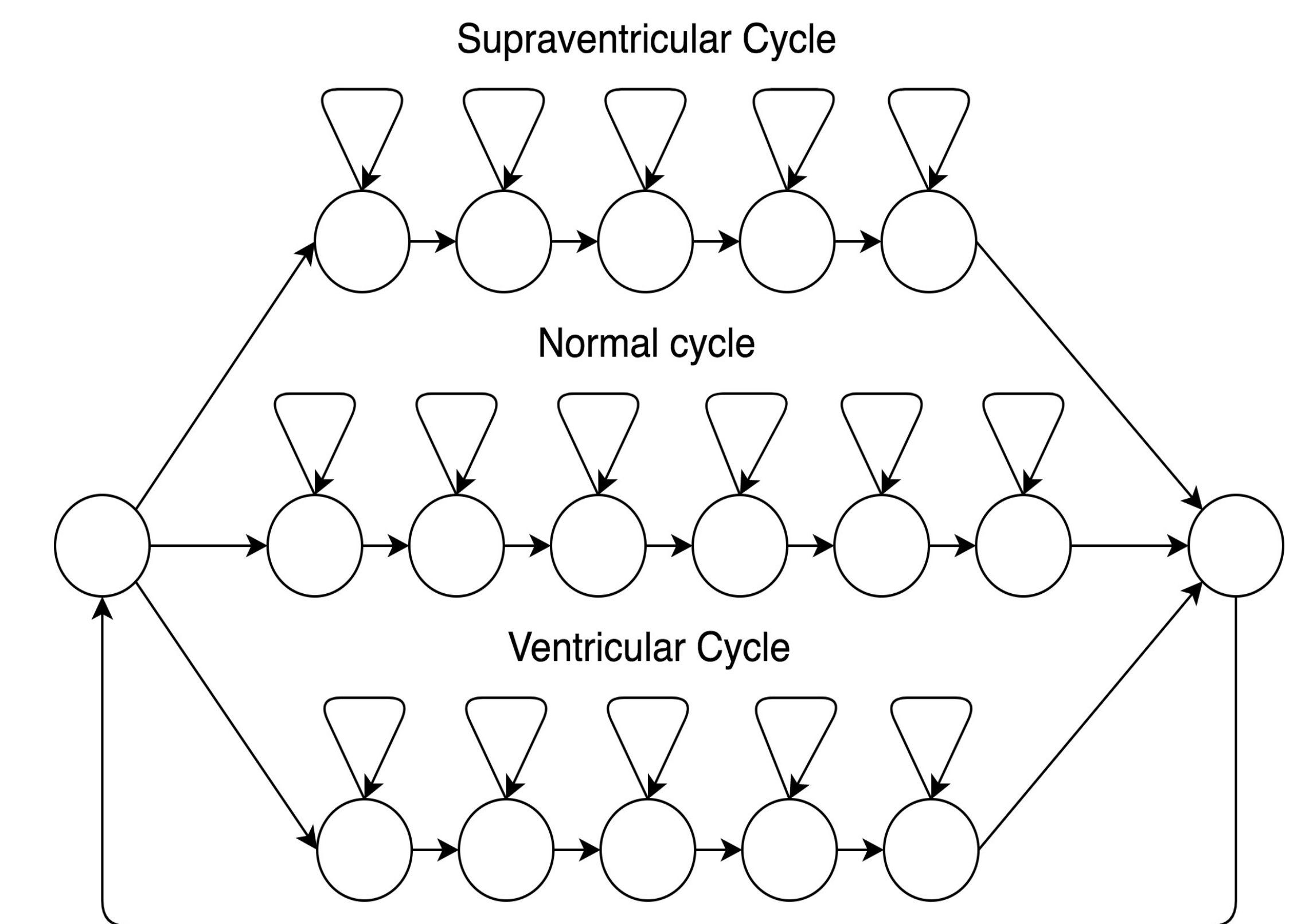


Figure 3: Markov Model Topology [4]

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References

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- [2] R. A. Dobrican and D. Zampunieris, "A proactive solution, using wearable and mobile applications, for closing the gap between the rehabilitation team and cardiac patients," in Healthcare Informatics (ICHI), 2016 IEEE International Conference on. IEEE, 2016, pp. 146–155.
- [3] J. Welch, P. Ford, R. Teplick, and R. Rubsamen, "The massachusetts general hospital-marquette foundation hemodynamic and electrocardiographic database—comprehensive collection of critical care waveforms," Clinical Monitoring, vol. 7, no. 1, pp. 96–97, 1991.
- [4] D. A. Coast, R. M. Stern, G. G. Cano, and S. A. Briller, "An approach to cardiac arrhythmia analysis using hidden markov models," IEEE Transactions on biomedical Engineering, vol. 37, no. 9, pp. 826–836, 1990.