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Classification Patient-Ventilator Asynchrony with Dual-Input Convolutional Neural Network

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Abstract

Mechanical ventilated respiratory failure patients may experience asynchronous breathing (AB). Frequent occurrence of AB may impose detrimental effect towards patient's condition, however, there is lack of autonomous AB detection approach impedes the explication of aetiology of AB causing underestimation of the impact of AB. This research presents a machine learning approach, a dual input convolutional neural network (CNN) to identify 5 types of AB and normal breathing by accepting both airway pressure and flow waveform profiles concurrently. The model was trained with 6,000 breathing cycles and validated with 1,800 isolated data collected from clinical trials. Results show that the trained model achieved a median accuracy of 98.6% in the 5-fold cross-validation scheme. When validated with unseen patient's data the trained model achieved an accuracy median of 96.2%. However, the model was found to misidentify premature cycling with reverse triggering. The results suggest that it may be difficult to clearly distinguish ABs with similar features and should be trained with more data. Nonetheless, this research demonstrated that a dual input CNN model able to accurately categorise AB which can potentially aid clinicians to better

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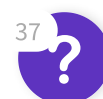
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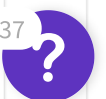
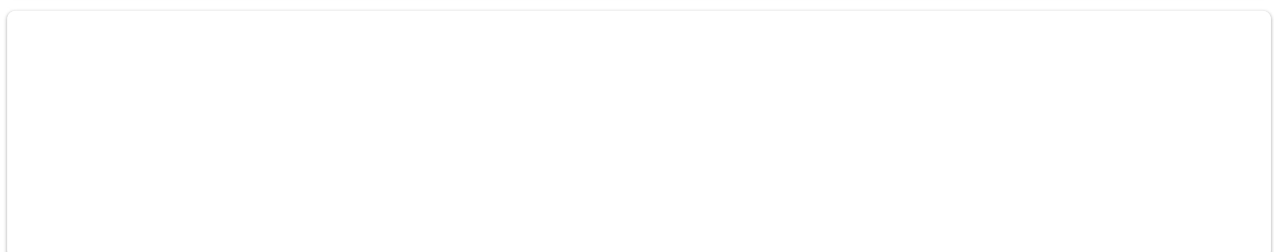
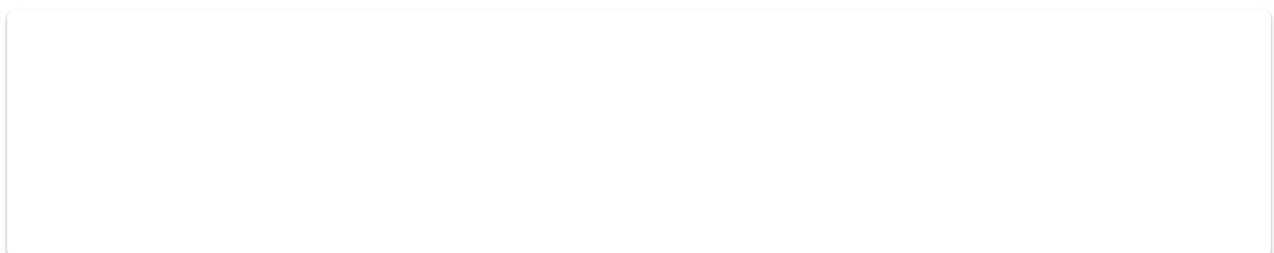
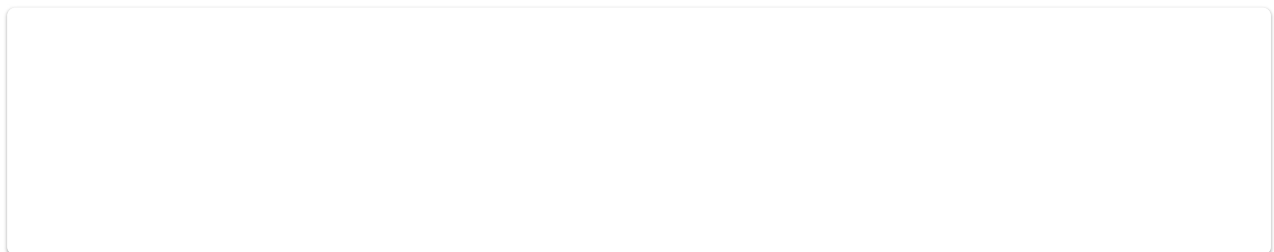
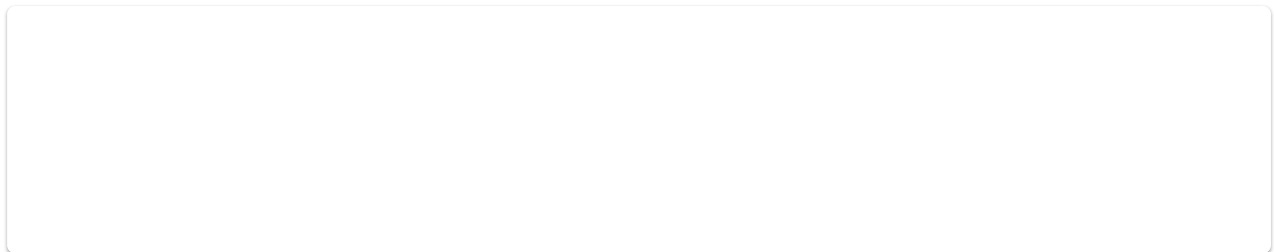
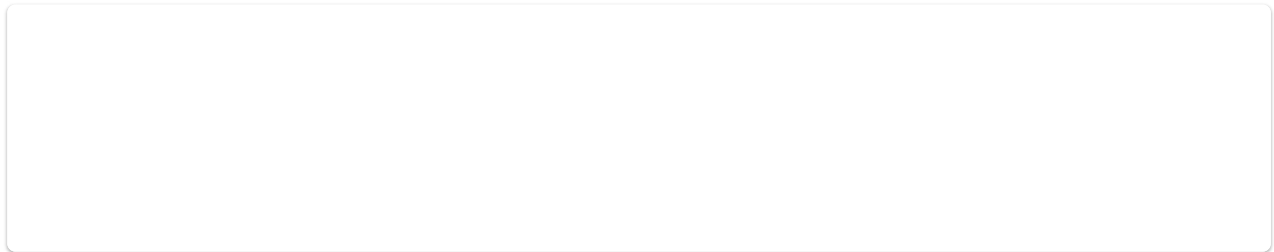
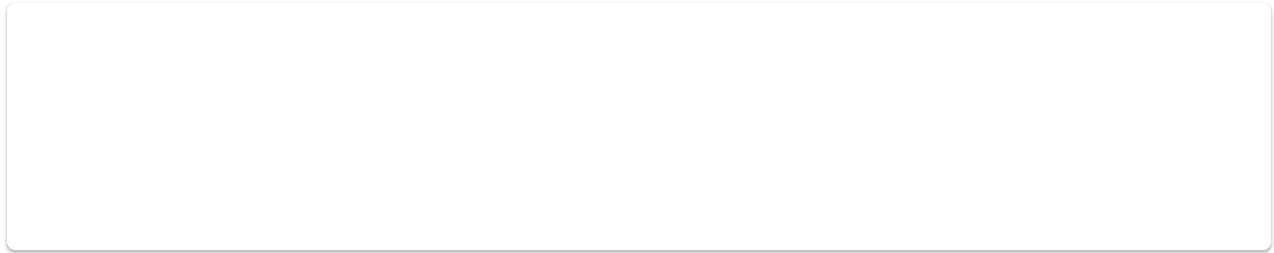


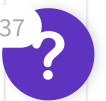
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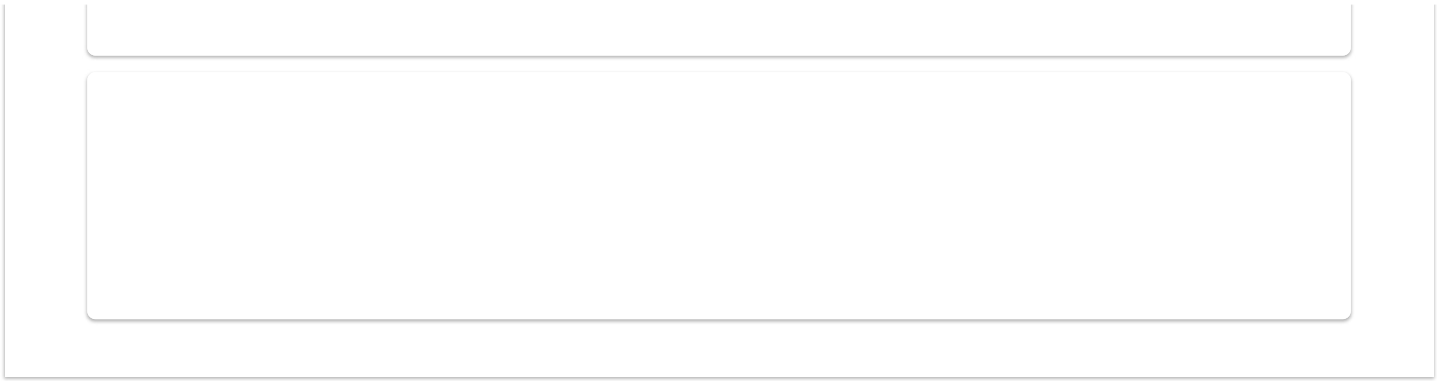
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