

Deep Learning To Extract Features From Neonate Lung Images Using EIT Data

Nafiseh Vahabi
Supervisor: Dr David R. Selviah
Department of Electronic and Electrical Engineering, Photonics Research Group



Each year 15 million babies are born prematurely and many suffer from immature lung and lack of controlled breathing

Why Does EIT Help?

Electrical Impedance Tomography (EIT) is the only imaging modality which is **non-invasive** (no ionising radiation) and **inexpensive**. It involves **convenient wires being attached to a patient for continued monitoring** and is capable of functioning at a high frame rate giving **good temporal resolution**.

Problem Complexity

- Images are highly complex to interpret
- Images are highly sensitive to changes in tissue property
- Images have very poor spatial resolution

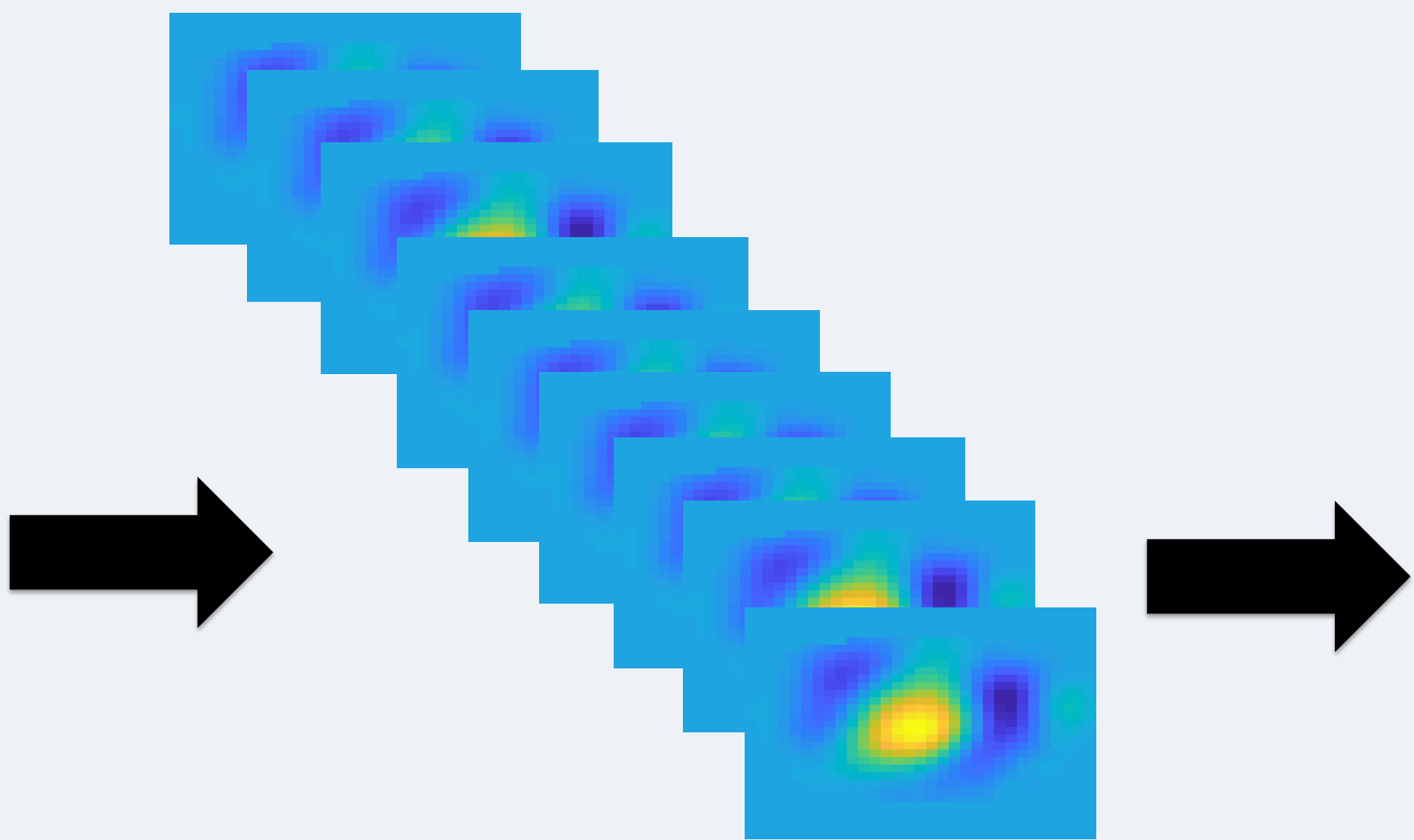
Application and Impact

- Monitoring of breathing during lung ventilation
- Monitoring of blood flow
- Monitoring neural and brain activity
- Monitoring gastric mobility
- Monitoring fluid volume of bladder

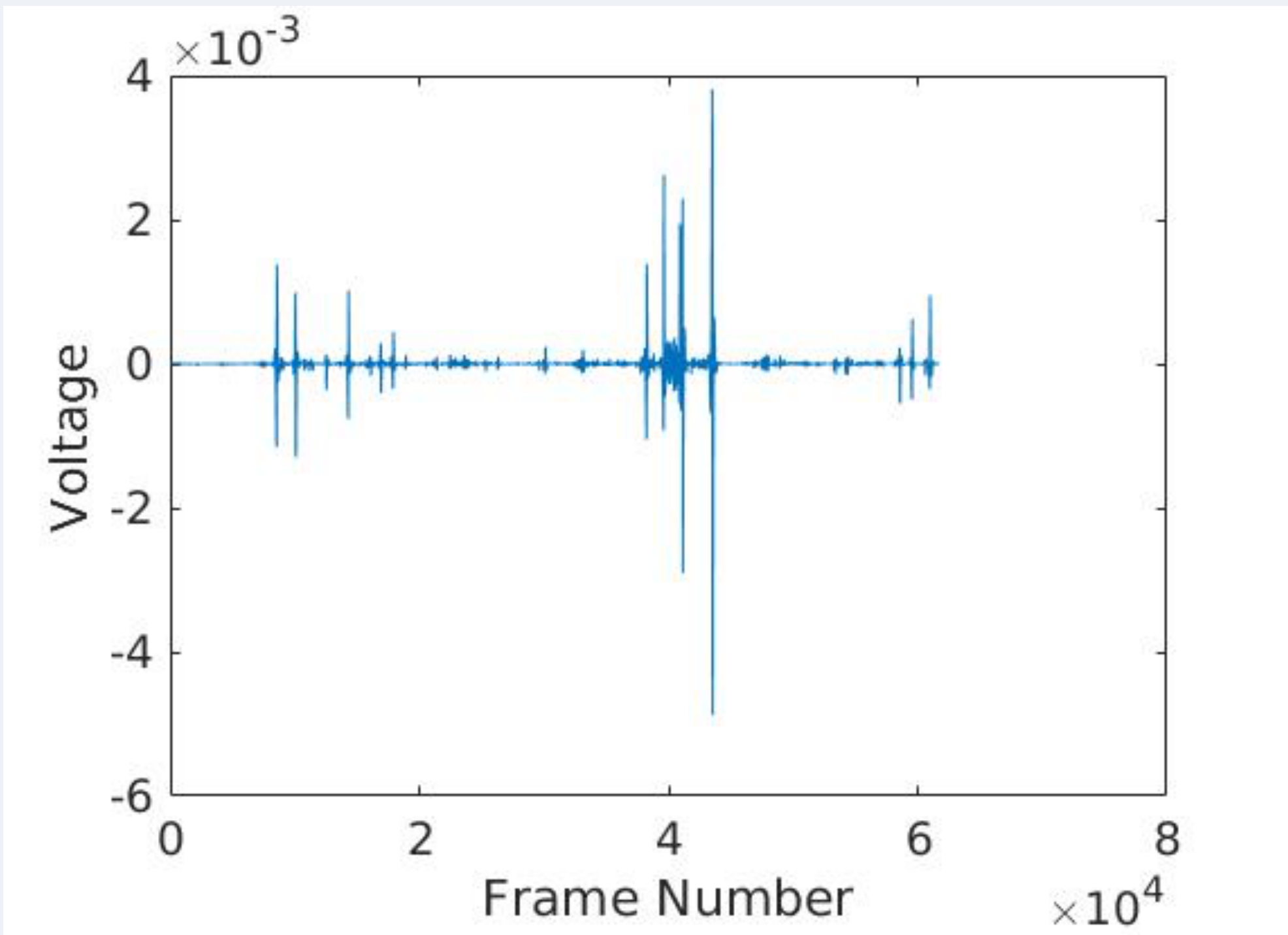
Methods



EIT Belt to Record The Voltage Data



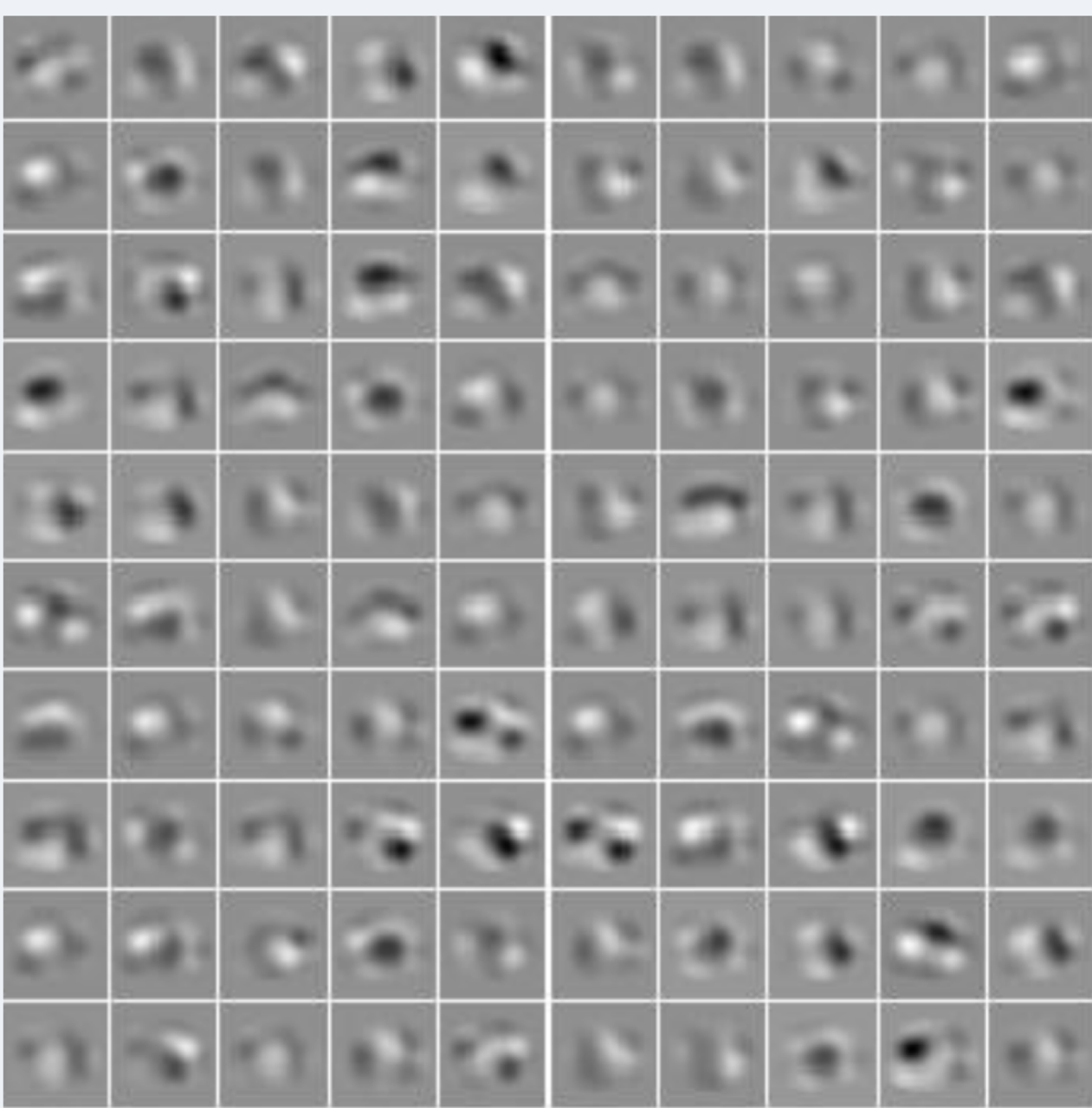
Reconstructed Images



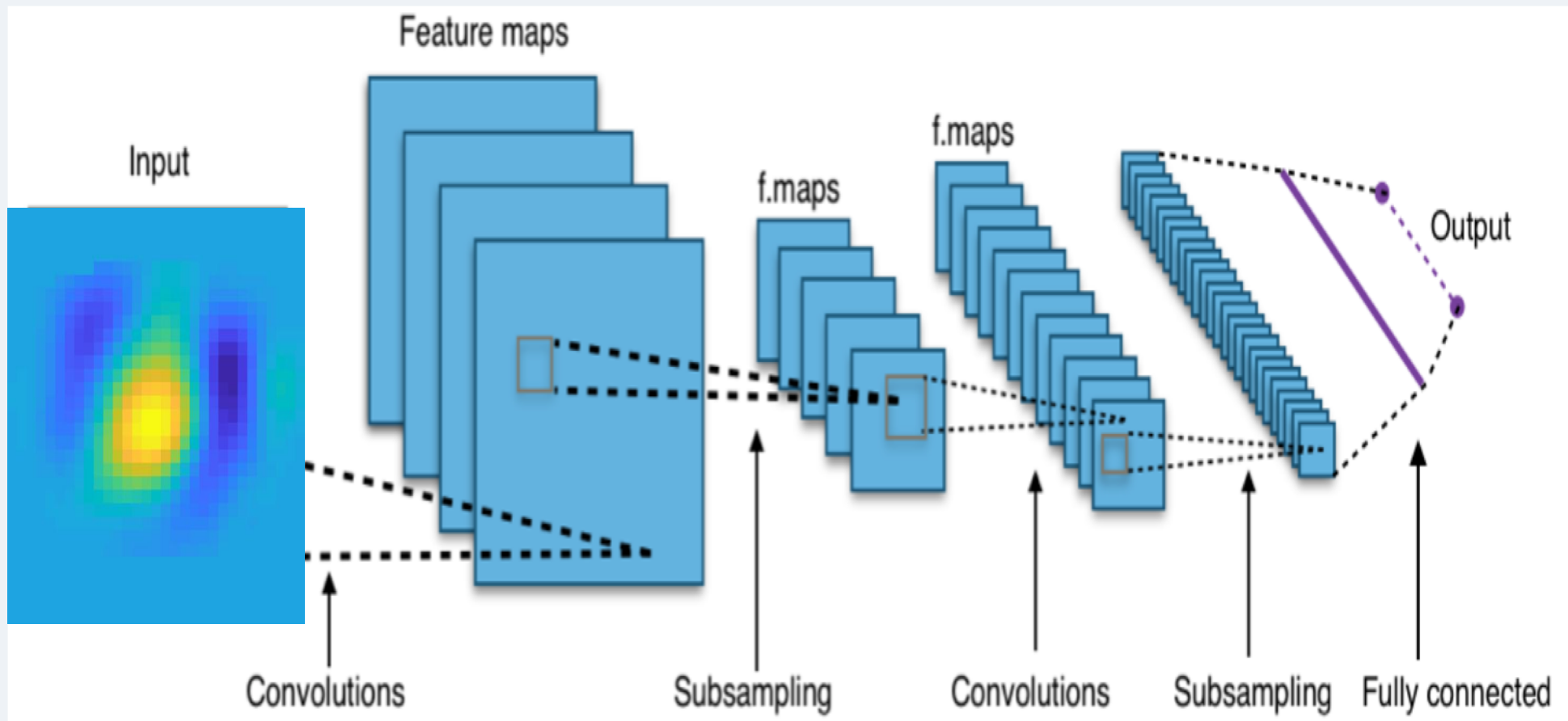
Suctioning Event



Feature Interpretation



100 Extracted Features



Feature Extraction Algorithm

Conclusion

- Identifying the effectiveness of each intervention event for baby's during lung ventilation
- Reconstruct EIT Images from voltage data to minimise the error from other reconstruction algorithms
- Helping clinician to interpret EIT images and intervene at the right time

Future Work

- Implementing existing algorithms to perform in real time situations
- Optimising the speed of image analysis by using NVIDIA GPU

