



Computer Vision: Automatic Image Annotation Using AutoML Method

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Data Acquisition Methods

- **Stereoscopic Data**
- **Still Images**
- **Big Data Extraction**
- **Video frames**

Data Storage Strategy

- **Scalability**
- **Accessibility**
- **Latency Issues**
- **Throughput**
- **Parallel Access**

Implemented DL Algorithms

- Gaussian Process, probabilistic model applied to multiclass data to simultaneously solve classification, regression problems
- Deep learning model featuring multi-stream, multi-variate data, simultaneously trained to predict quantitative score on image quality in real-time
- Unsupervised model featuring (2D+t) time series for sequential frame classification
- Semi-supervised ensemble model featuring pattern recognition and automatic label annotation
- Design of a Lightweight Neural Network using AutoML (NAS) method

Automatic Image Annotation Model

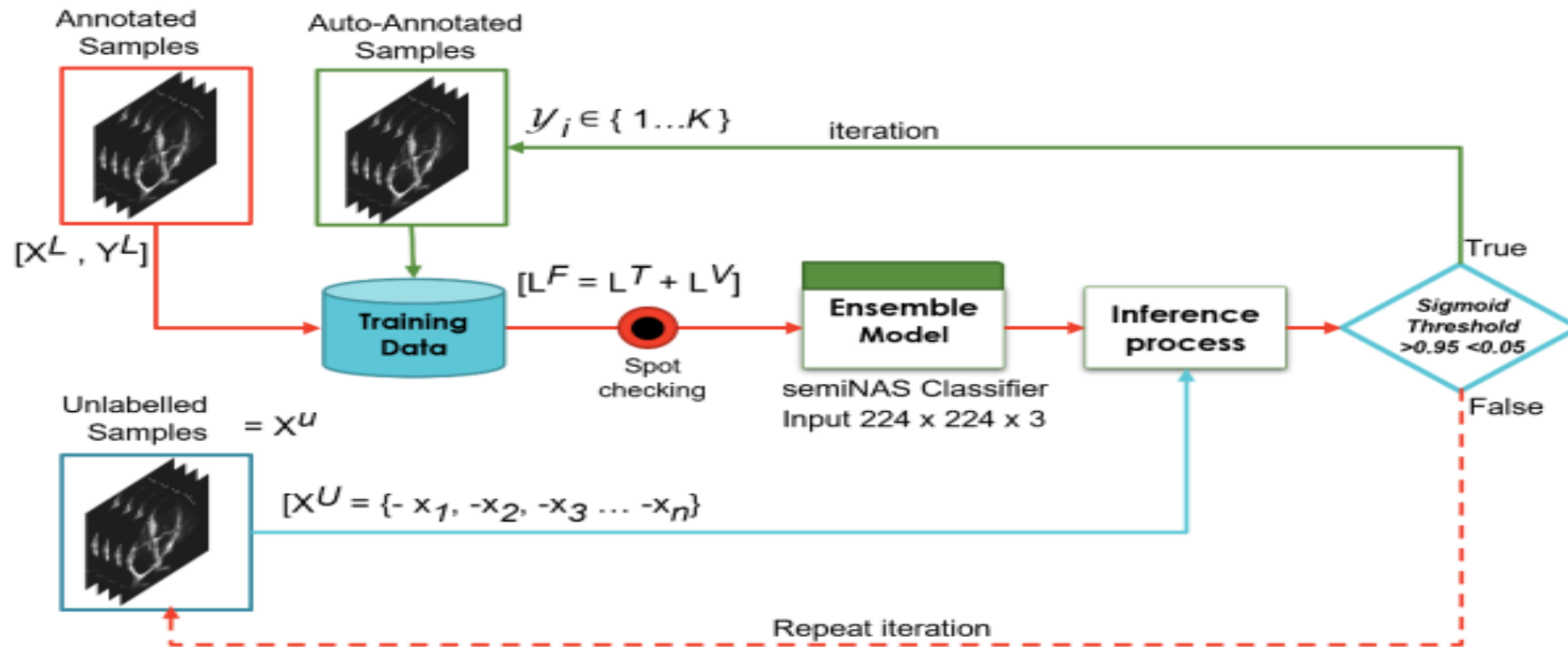


Figure 6.3: Illustration of a robust semi-supervised pipeline implemented for pseudo-labelling process in objective characterization of 2D-echocardiogram samples.

Achieved Objectives

- Self supervised learning model with capability for self tuning, multivariate optimization, and adaptive learning on 2D/3D images classification
- Characterize and identify the appropriate annotation and pseudo-labelling capability on trained data.
- Provide real-time annotation for unlabelled samples with semi-supervised spot-checking options.



Research Outcomes

- Model were validated against known models: DenseNet, ResNet and VGGNet achieved 91.6%, 90.3% and 94.2% respectively.
- The derived lightweight model outperformed the chosen state-of-the-art models on 2D echo cine loop video in terms of inference speed (1.75ms), and mean accuracy of 98.68% and mean model error of 0.24+/- 0.0037.

Research Impacts

- Clinical Antenatal Investigations
- Medical Emergencies (POCUS)
- Diagnosis of Infarction
- Cardiac prognosis and risk factor treatment
- Obstetrician & Gynaecological investigation
- Accelerate learning curve for novice users

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