Uncertainty-Aware COVID-19 Detection from Imbalanced Sound Data

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World Health Organization

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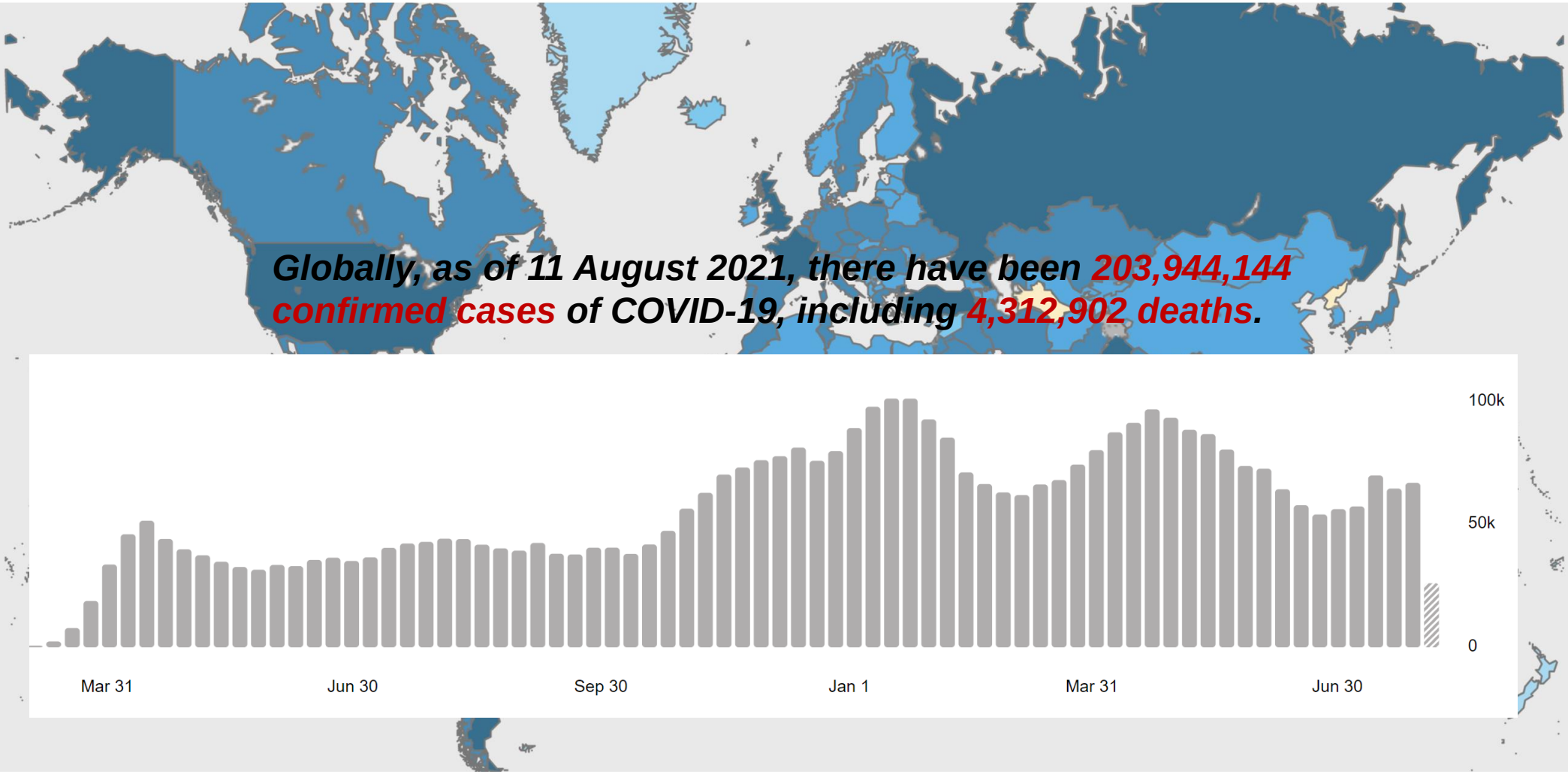
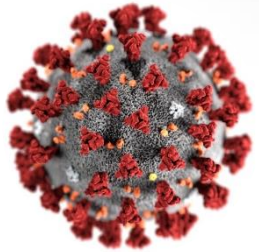
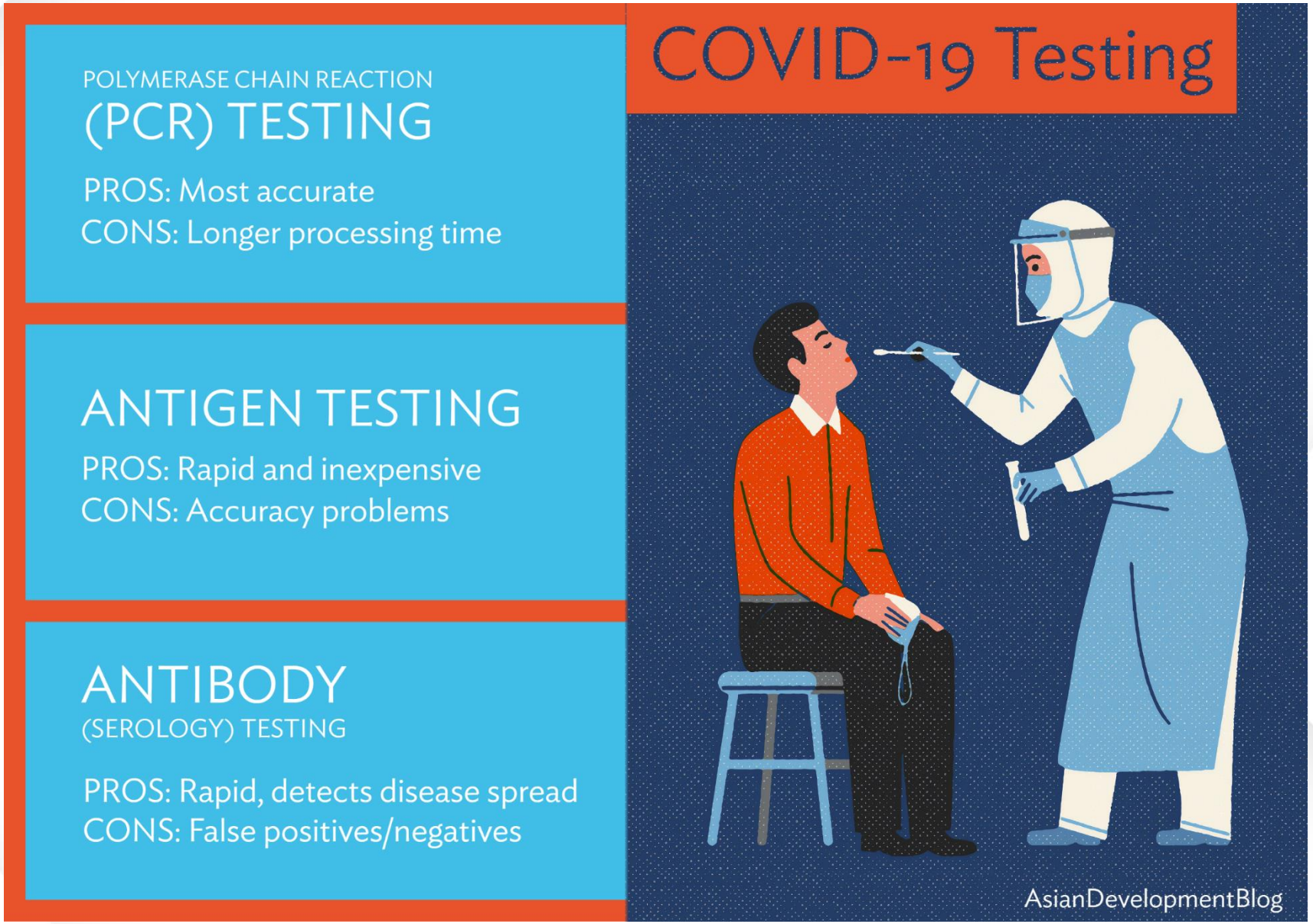
WHO Coronavirus (COVID-19) Dashboard

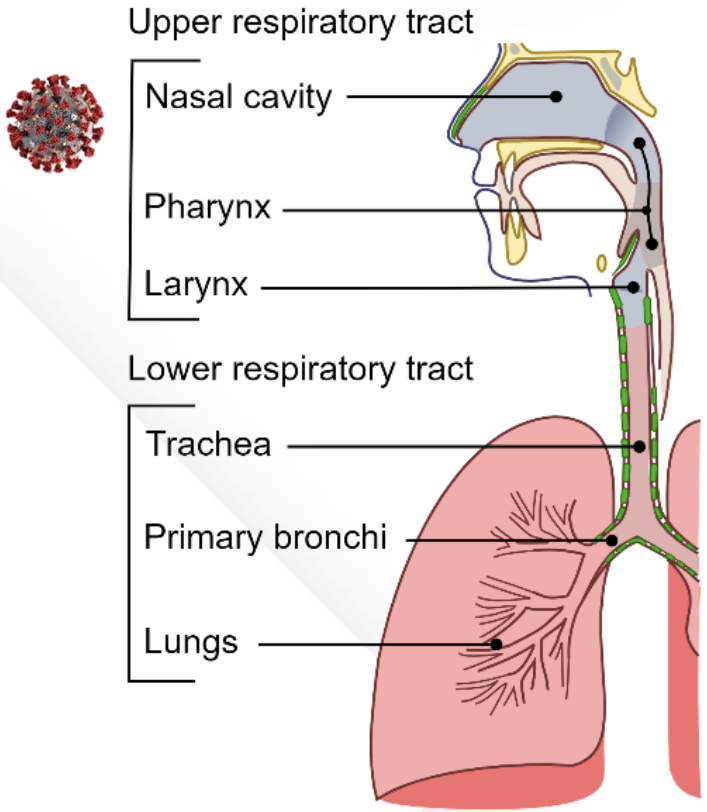
Overview | Data Table | Explore





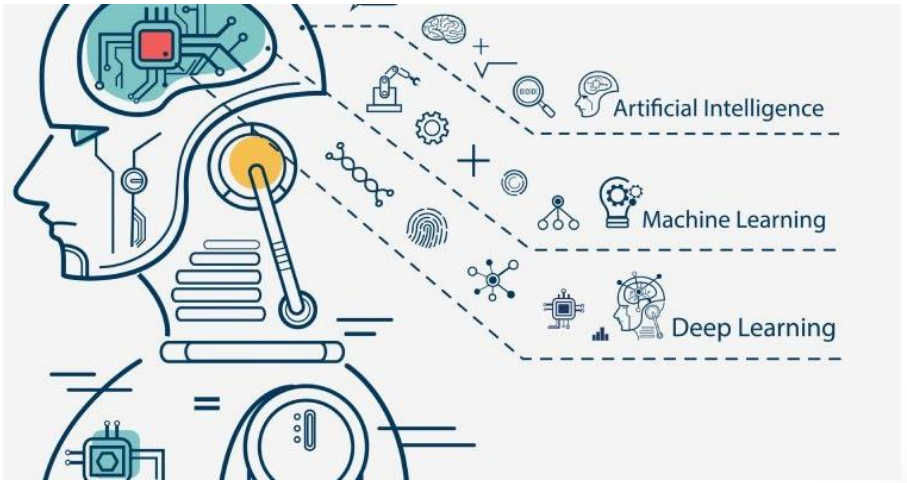
- ***Invasive***
- ***Expensive***

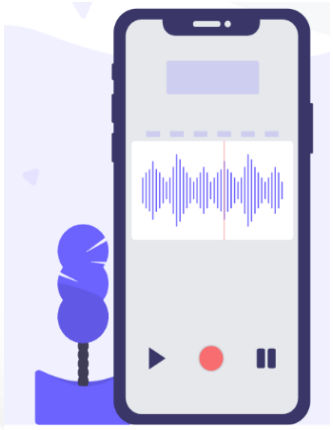




Automatic COVID-19 Screening from sounds

- *COVID-19 Artificial Intelligence Diagnosis using only Cough Recordings，MIT*
- *COVID-19 Sounds, the University of Cambridge*
- Coswara, Indian Institute of Science (IISc) Bangalore, etc.



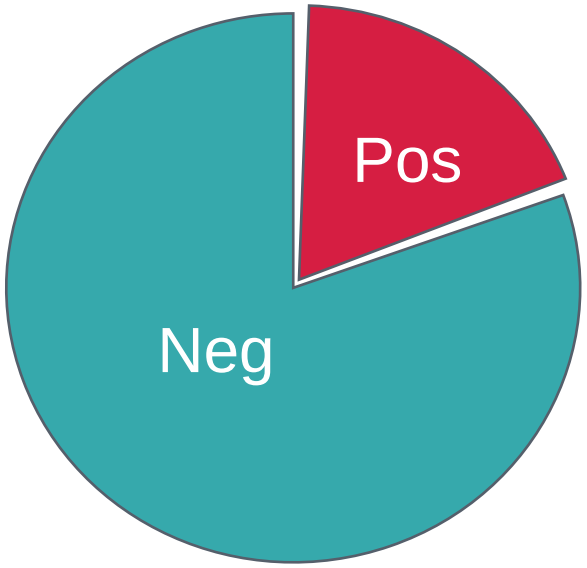


- Affordable
- Non-invasive
- Timely
- Ubiquitous

Unsolved challenges of sound-based COVID-19 detection

Challenge I:

Sparse and imbalanced audio data



469 tested positive samples
1,526 tested negative samples

Challenge II:

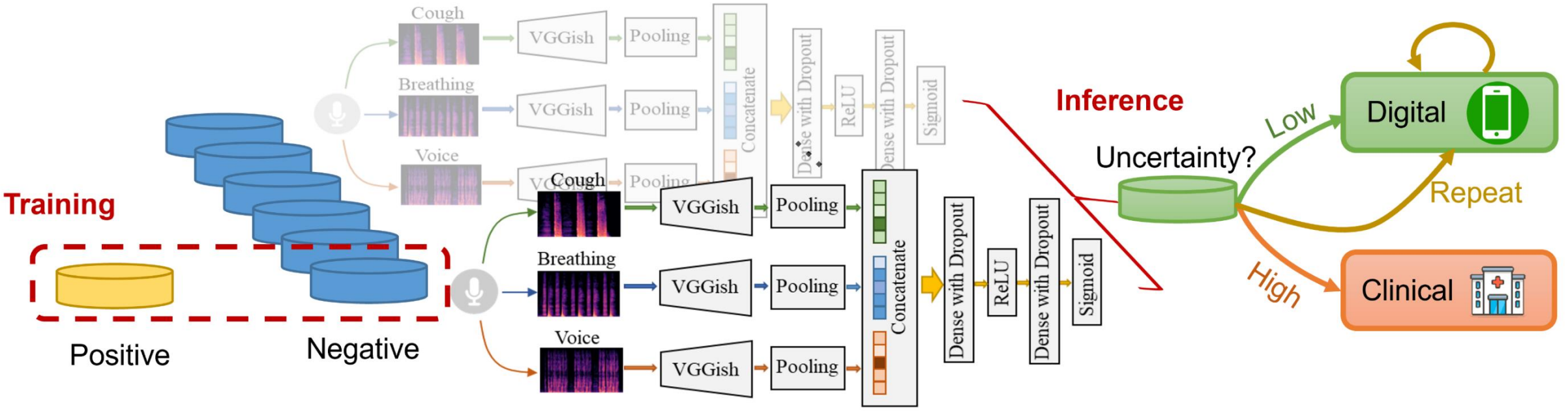
Lack of confidence estimation

Over-confident

Difficult diagnosis

Measuring uncertainty

Ensemble framework



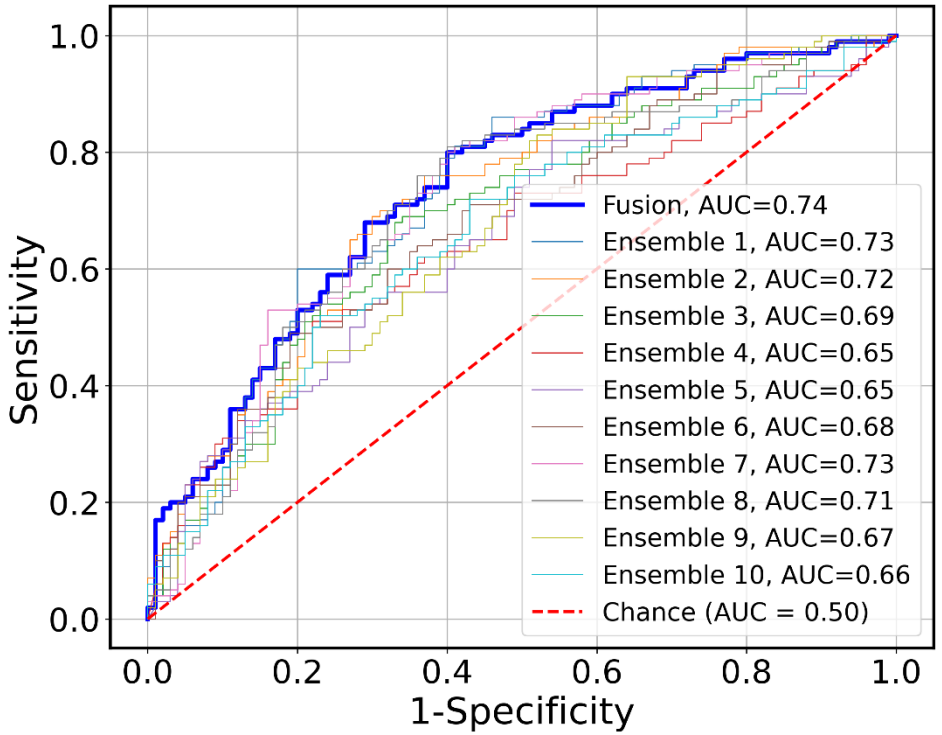
Data sampling

Model learning

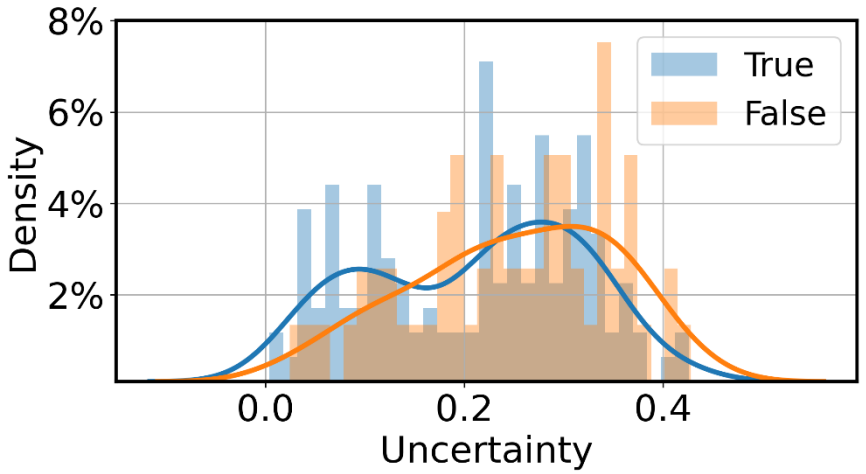
Uncertainty qualification

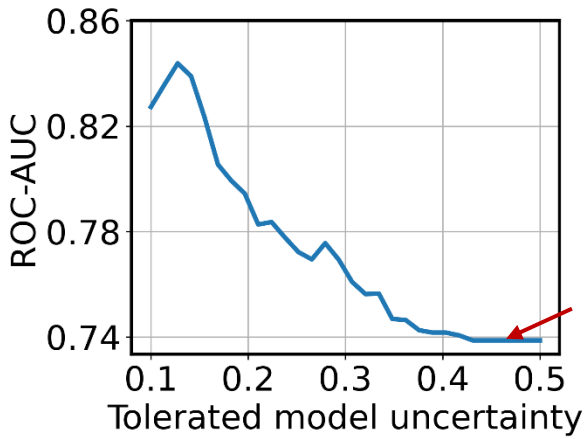
Uncertainty-aware COVID-19 detection from sounds

		ROC-AUC	Sensitivity	Specificity
Ensemble model	SVM	0.66(0.04)	0.63(0.05)	0.62(0.04)
	CNN	**0.74(0.03)**	**0.68(0.05)**	0.69(0.06)



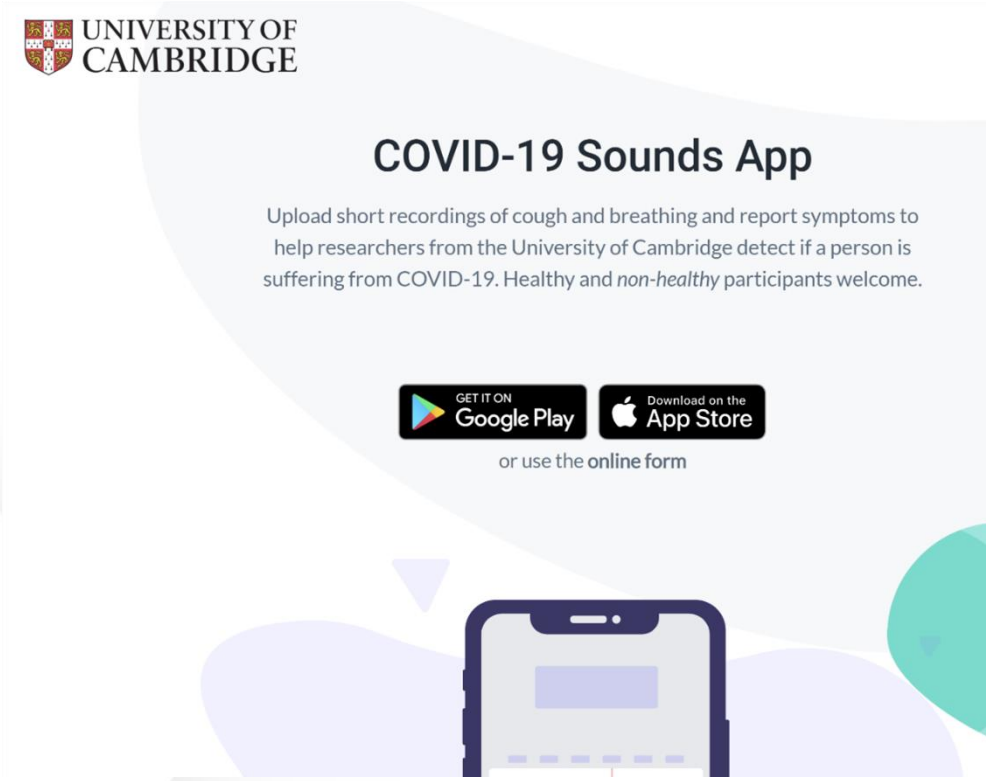
Ensemble fusion outperforms single unit.





Reject the least confident predictions.

Welcome to use our COVID-19 Sounds App !



Contact: tx229@cam.ak.uk

Paper session:

Thu-M-V-1 Thursday, September 2, 11:00-13:00 Virtual: Assessment of pathological speech and language II

- 11:00 **Thu-M-V-1-9** 1320 *Uncertainty-Aware COVID-19 Detection from Imbalanced Sound Data*