How Can Artificial Intelligence Improve Fetal Screening?


The Problem:
All pregnant people in the UK are offered an ultrasound scan at 20 weeks' gestation. The problem is that not all babies with health problems are diagnosed before birth. Aim is to diagnose fetal health problems before birth, which would lead to better survival after birth for affected babies and better long-term development for affected babies. Unfortunately not all babies are correctly diagnosed. This map illustrates the huge regional variation in prenatal detection of serious congenital heart disease around the UK. In some areas of the UK this is below 30%: a diagnostic postcode lottery.

Solution:
Train artificial intelligence (AI) to help sonographers. Imaging data collected from over 10,000 routine and 6,000 specialist fetal ultrasound scans. Machine learning models trained for automatic measurement of fetal size and automatic classification of fetal view. Combined into a single clinically usable package. Outputs of AI models fed back to sonographer in real time.

Study of AI tools in 23 pregnant women with healthy fetuses:
AI-assisted scans were significantly faster, saving over 7 minutes on average. Automated measurements were accurate and reproducible.

Ongoing work:
AI tools to revolutionise the diagnosis of heart abnormalities before birth. Taking the previous study further:
- 87 pregnant women, including some with fetal health problems
- 58 volunteer sonographers from across London
- All women scanned twice, to compare manual vs AI-assisted scanning
- The first randomised clinical trial in the world using AI in this way
- Aim is to assess impact of AI on diagnostic rates and time savings
- Will be completed in Summer 2023

References: