

Algorithms at the Heart of the Matter

How UCSF is using machine learning to predict fetal heart defects

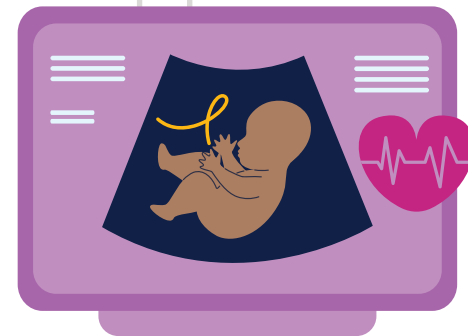


DISCOVERY

UCSF researchers have found a way to double doctors' accuracy in detecting complex fetal heart defects in utero by combining routine ultrasounds with machine learning tools. Here's how.

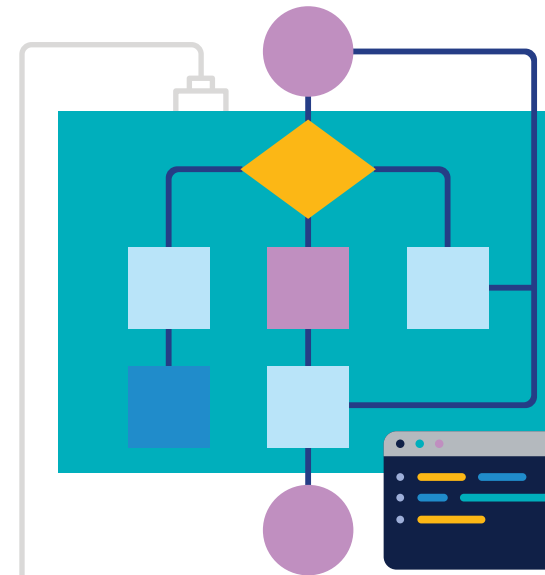
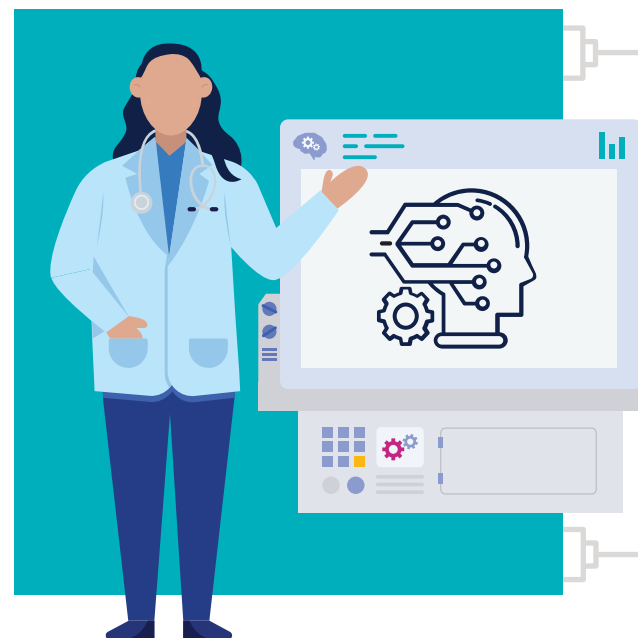
CHALLENGE

In the US, fetal ultrasound screening is universally recommended during the second trimester of pregnancy. In theory, this imaging could help clinicians to diagnose up to 90% of congenital heart disease. But in practice, only about half are detected by the human eye.



DESIGN

UCSF cardiologist Rima Arnaout, MD, has harnessed the power of machine learning – a method of data analysis that uses algorithms to automate learning and decision making – to vastly improve diagnoses and give more kids a better chance of survival.

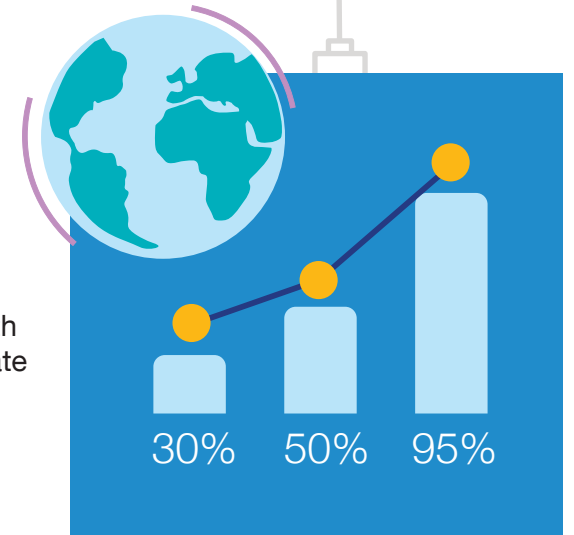


IMPLEMENTATION

The algorithm includes three steps. First, identify five views of the heart that are necessary for diagnosis. Then, determine whether or not each of these views is normal. Finally, combine the results from steps 1 and 2 to generate an accurate result.

RESULTS

Worldwide, diagnosis by humans detects only 30-50% of congenital heart conditions before birth. When UCSF researchers combined human-performed ultrasound with machine analysis, however, the detection rate surged to 95%.



IMPACT

By vastly improving early diagnosis of fetal heart defects, we can propel critical research and discovery forward while also helping children lead longer, healthier lives. “We hope this work will revolutionize screening for these birth defects,” Dr. Arnaout says.