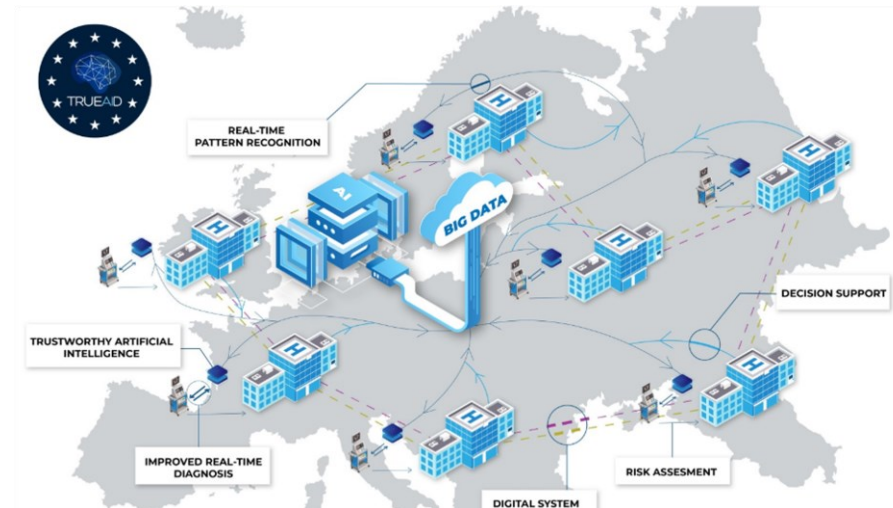




Research Institute Verlab for Biomedical Engineering, Medical Devices and Artificial Intelligence
Doctoral thesis of Lemana Spahić, PhD



TRUEAID: Trustworthy AI for Early Detection of Antenatal Neurological Disorders and Neurodevelopmental Risk Assessment in Fetuses



Research Team



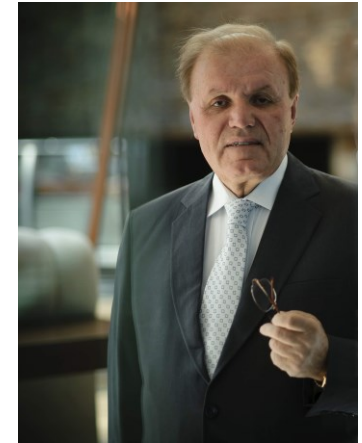
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Project description

Fetal neurological impairment disorders are a group of conditions that affect the development of the nervous system in the fetus.

- The United Nations emphasizes that child survival and thriving depends on a combination of high-impact interventions – including quality antenatal care for mothers and their newborns.
- These efforts emphasized the importance of timely diagnosis and are in line with the United Nation Sustainable Development Goal 3 (SDG3) formulated as: "To ensure healthy lives and promote well-being for all at all ages."

Kurjak Antenatal Neurodevelopmental Test (KANET)

- At the core of KANET's groundbreaking approach is the use of four-dimensional (4D) ultrasound technology
- KANET test is the golden diagnostic standard for evaluation of fetal neurodevelopmental risks
- The test relies on observation of characteristic fetal movements during late the third trimester of pregnancy

The dataset for the development of the decision support system consisted of 3D ultrasound images

- The images were extracted from 4D ultrasound recordings of fetuses made during the KANET test
- 10452 samples were acquired in the time period from 2021 to 2023

In order to acquire the necessary data and facilitate effective analysis, a short-term scientific mission was undertaken in Athens

- Funded by the Grand of COST action CA20124 - Maximising Impact of Multidisciplinary Research in Early Diagnosis of Neonatal Brain Injury (AI-4-NICU)

Objectives and aims of the work

The overall goal of the project is to establish new knowledge in prediction of risk for neurological disorders and to explore the feasibility and trustworthiness of a new technology for this purpose.

This goal contributes to the advancement in the management of non-communicable diseases and making fetal neurodevelopmental disorders and risk assessment available to all.

This project is driven by a consortium vision, ambition and commitment to bring the AI technology to actual use in obstetrics and gynecology for prevention and detection of neurological diseases in order to improve the well-being of affected populations (pregnant women - mothers and infants - children with neurological conditions).

Once developed and proven TRUEAID can be used anywhere in the world, from low resource to high resource settings enabling better care of affected populations and supporting the fight against non-communicable neurological diseases.

The project goes beyond the state of the art in neurological risk assessment and disease prediction, demonstrating a high innovation potential, as it examines novel concepts in the field of digital health and integrated care in neurological diseases, testing a new digital health tool service.

TRUEAID is developed and is currently at **TRL4**.

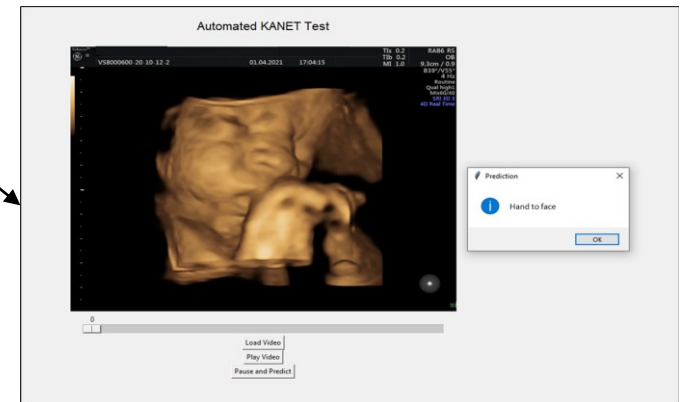
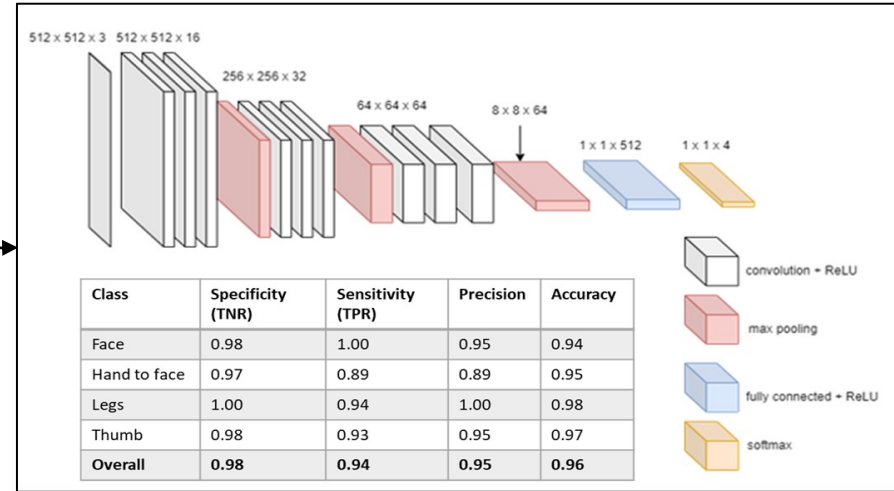
TRUEAID application in practice involves 4 steps:

Step 1: Load the ultrasound recording (using a developed GUI)

Step 2: Parse the frame through the CNN (by a single click on „pause and predict“ within the GUI)

Step 3: Obtain results for each frame (in form of a pop-up)

Step 4: Perform diagnosis on the basis of characteristic movement detection and scoring





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