Preventive Medical Screening in Unborn

During the 5th week of gestation, a heartbeat-like signal can be detected in the embryo for the first time. However, the unborn has to develop further for this signal to carry relevant medical information. After the embryo evolved into a fetus, heartbeat measurement can be a valuable technique to measure fetal distress, avoid unecessary cesarean sections and detect pathologic development early on.
Based on inspection of frequency, amplitude and other properties of the fetal heartbeat, various diseases can be directly diagnosed or other investigative tools can be selected. However, recording and isolating a clear signal in the maternal abdomen is tedious and requires complex machinery. Thus, an easier and more accessible method for recording is a multi-electrode system that is placed to the mother's abdomen. Combining the information provided by the individual electrodes, digestive noise and maternal heartbeat can be filtered out to obtain a reliable fetal heartbeat signal.

What you have:

1. A dataset of abdominal recordings from a group of gestating patients.

Your tasks:

1. Extract the maternal and fetal heartbeat from the multi-electrode recordings provided.

Week 2: Pathology Detection

Once fetal heartbeats can be successfully extracted from the data, a useful application is the detection of irregularities in the recordings. If an irregular heartbeat pattern is found, further investigation or direct treatment can be of central importance to ensure the well-being of mother and unborn.

Your tasks:

1. Based on your analysis of the fetal heartbeat, provide a recommendation for patients that should receive an in-depth medical checkup.