CLAIMS

What is claimed is:

1. A medical prediction system configured to predict premature births, the medical prediction system comprising:

an image storage configured to store ultrasound images, the ultrasound images including a fetus;

image analysis logic configured to provide a quantitative prediction that the fetus will be born prematurely based on the ultrasound images, wherein the image analysis logic is configured to use a regression algorithm to provide the quantitative prediction, including an estimate that the fetus will be born prematurely within two or more time ranges and wherein the image analysis logic further comprises

first logic configured to estimate a gestational age of the fetus based on the ultrasound images, the gestational age being at a time the ultrasound images were generated,

second logic configured to estimate a time until birth of the fetus based on the ultrasound images, and

third logic configured to calculate an estimated gestational age of the fetus at birth;

a user interface configured to provide at least the prediction that the fetus will be born prematurely to a user; and

a microprocessor configured to execute at least a part of the image analysis logic.

2. The medical prediction system of claim 1, further comprising an image generator configured to generate the ultrasound images.

3. The medical prediction system of claim 2, wherein the image generator comprises a sound source, a sound detector and logic configured to generate the ultrasound images based on sound detected by the sound detector.

4. The medical prediction system of claim 2, wherein the image generator is configured to adapt the generation of the ultrasound images based on an output of the image analysis logic.

5. The medical prediction system of claim 2, wherein the image generator is configured to generate a sequence of images representative of motion of a fetus, the image sequence optionally including fetal blood flow, capillary profusion, and/or heart movement.

6. The medical prediction system of claim 2, wherein the image generator is configured to direct a user to modify a position of a sound source configured to generate the ultrasound images.

7. The medical prediction system of claim 1, further comprising a data input configured to receive clinical data regarding the fetus or a mother of the fetus, wherein an estimated time until birth of the fetus is based on the clinical data.

8. The medical prediction system of claim 1, further comprising feedback logic configured to guide acquisition of the ultrasound images based on a quality of the prediction that fetus a will be born prematurely or classification of the images acquired into subject matter classes.

9. The medical prediction system of claim 8, wherein the feedback logic is configured to guide a positioning of the image generator so as to generate images more useful in the prediction that the fetus will be born prematurely.

10. The medical prediction system of claim 8, wherein the feedback logic is configured to indicate a need to acquire additional ultrasound images useful in the prediction that the fetus will be born prematurely.

11. The medical prediction system of claim 1, further comprising training logic configured to train the logic configured to estimate a time until birth of the fetus.

12. The medical prediction system of claim 1, wherein the ultrasound images including the fetus are generated over a period of time including at least three months.

13. The medical prediction system of claim 1, wherein the ultrasound images include doppler information, or fluid, bone or tissue density information.

14. The medical prediction system of claim 1, wherein the image analysis logic is configured to use the regression algorithm to output a range prediction to provide an estimate that the fetus will be born prematurely.

15. The medical prediction system of claim 1, wherein the image analysis logic is configured to provide an estimate that the fetus will be born prematurely using a classification algorithm, the classification algorithm including at least two classifications of birth timing.

16. The medical prediction system of claim 1, wherein the image analysis logic includes a neural network configured to receive the ultrasound images and to generate an output representative of the prediction that the fetus will be born prematurely.

17. The medical prediction system of claim 1, wherein the image analysis logic includes a neural network configured to receive the ultrasound images and to generate an output indicative of a time until birth of the fetus.

18. The medical prediction system of claim 1, wherein the quantitative prediction that the fetus will be born prematurely includes an estimate of a probability that the fetus will be born prematurely, the estimate being based on an ultrasound image, of the ultrasound images, of a cervix and/or amniotic fluid index.

19. The medical prediction system of claim 1, wherein the quantitative prediction is based on an ultrasound image, of the ultrasound images, including an endometrium and/or a uterine wall.

20. The medical prediction system of claim 1, wherein the user interface is configured to provide at least two of: the gestational age, the estimated time until birth and the gestational age of the fetus at birth.

21. The medical prediction system of claim 7, wherein the image analysis logic is further configured to predict that the fetus will be born prematurely based on ~~the~~ clinical data received via the data input.

22. The medical prediction system of claim 21, wherein the clinical data includes at least one of: mother genetics, mother weight, mother pregnancy history, mother blood glucose, mother heart function, mother kidney function, mother blood pressure, placenta condition, mother infections, mother nutrition, mother drug use, mother age, mother cervix or uterus characteristics.

23. The medical prediction system of claim 11, wherein the image analysis logic includes a machine learning system and the training logic is configured to pretrain the machine learning logic to recognize features in the ultrasound images.

24. The medical prediction system of claim 11, wherein the image analysis logic includes a machine learning system and the training logic is configured to train the machine learning system to make the quantitative prediction that the fetus will be born prematurely.

25. The medical prediction system of claim 11, wherein the image analysis logic includes a machine learning system and the training logic is configured to train the machine learning system to use both the regression algorithm and a classification algorithm to make the prediction that the fetus will be born prematurely.