

EP08.16 Improved Fetal Weight Estimation using Deep Learning from Ultrasound Images and Biometric Data

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Context

Estimated fetal weight (EFW) is commonly used to diagnose fetal growth issues and guide management decisions like delivery timing and surveillance. However, EFW is often inaccurate, differing from actual birth weight by over 10% in 25-30% of cases and by over 20% in 5-10% of cases [Stubert 2018, Milner 2018].

Objectives

A multi-modal machine learning model (not yet approved) for EFW was developed using ultrasound images, gestational age (GA), and key biometrics. The objective is to compare the accuracy of our model versus traditional methods across varying intervals between ultrasound and delivery (latency).

Methods

This retrospective study analyzed 1,119 ultrasound exams from two US sites (70/30 split for training and validation), with an independent test set of 643 T2–T3 exams from the same sites for evaluation. EFW was predicted using a deep learning-based feature extractor for ultrasound images, along with GA and biometrics. The method of Mongelli & Gardosi was employed to predict BW from EFW at different latencies [Mongelli1996]. Model performance was assessed by comparing the accuracy of predicted BW based on EFW from the deep learning model versus the Hadlock 3-parameter and Hadlock 4-parameter formulas, using mean error (ME), mean absolute error (MAE), and root mean squared error (RMSE).

Conclusion

The proposed method provides a robust framework for estimating EFW and predicting BW, outperforming traditional Hadlock formulas and possibly enhancing accuracy in clinical practice. Such results obtained on a small dataset are promising for future work incorporating more data from various centers.

Results

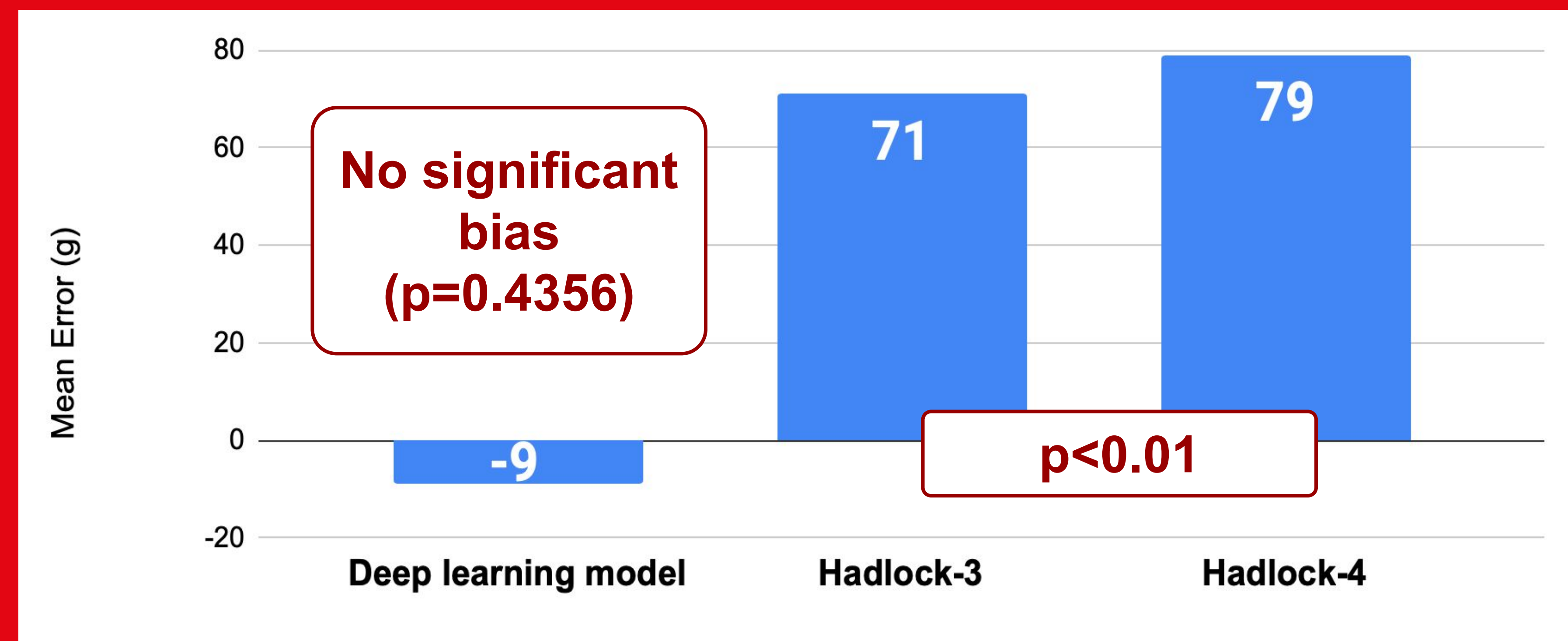


Figure 1. Mean Error in Birth Weight Estimation

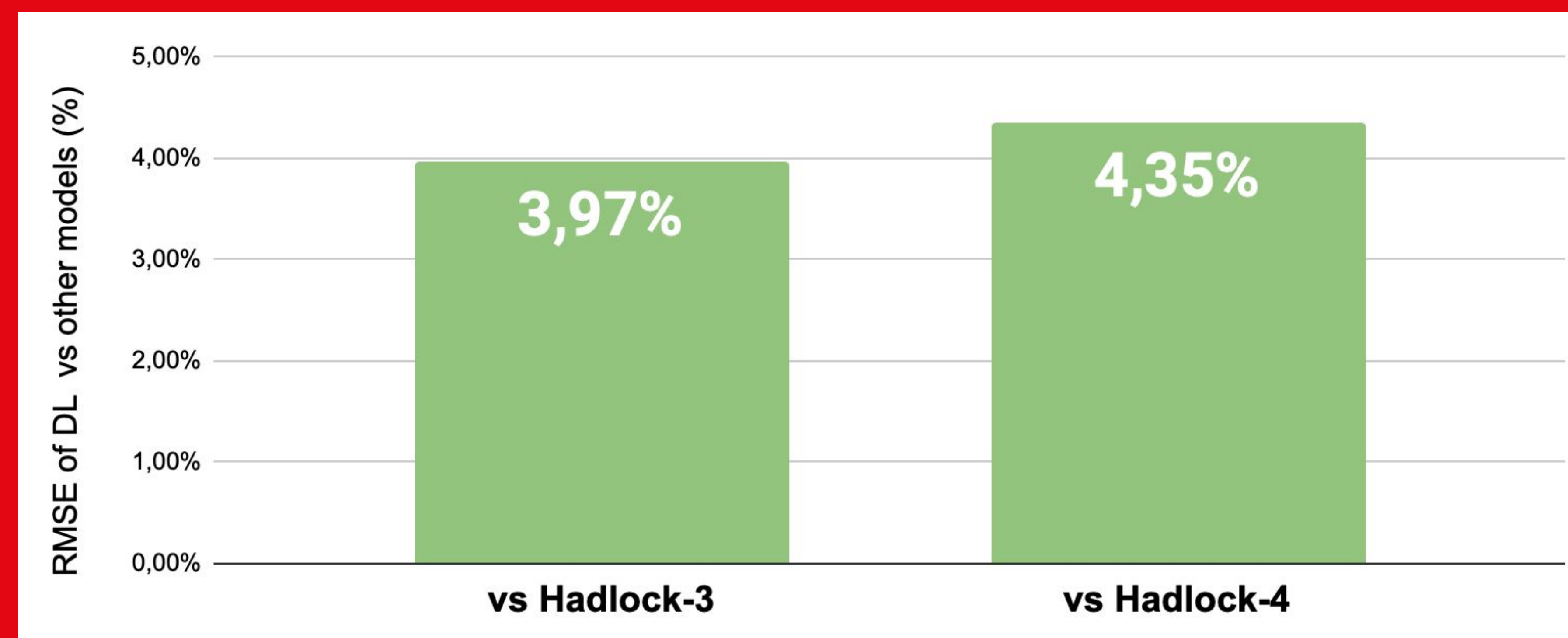


Figure 2. RMSE Reduction of the DL Model vs. Hadlock Formulas (Latency 0-3.9 weeks)

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