Predicting Fetal Macrosomia

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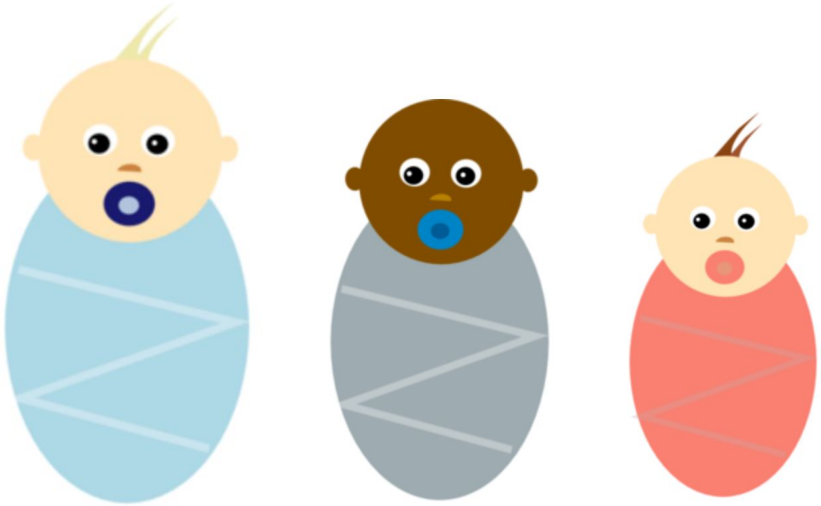
Can we build a model to predict which babies will be born large?



Definition

- Weight > 4000g (8 lb 13 oz) at birth

Prevalence

- 8% of U.S. births

Motivation (I)

Current estimation methods are inaccurate

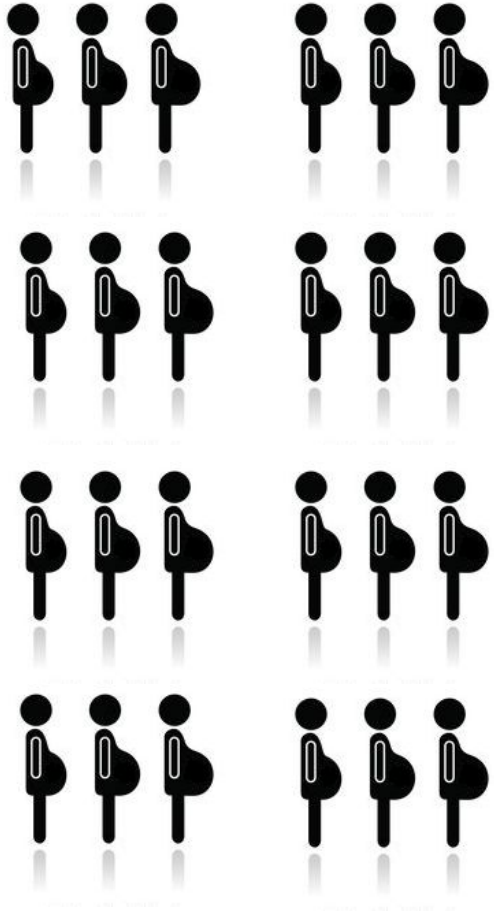
- Ultrasound, clinical exam
- Contemporary U.S. practice*:
  - 80% of predicted large babies weigh < 4000 g
  - About 62% of actual large babies correctly predicted

*Cheng et al (2015)

Motivation (II)

Costs of inaccuracy

- Failing to predict large babies
  - Risks missing high-risk births[+]
  - Could make needed medical care less likely
- Incorrectly predicting large babies
  - Encourages unnecessary medical interventions[*]



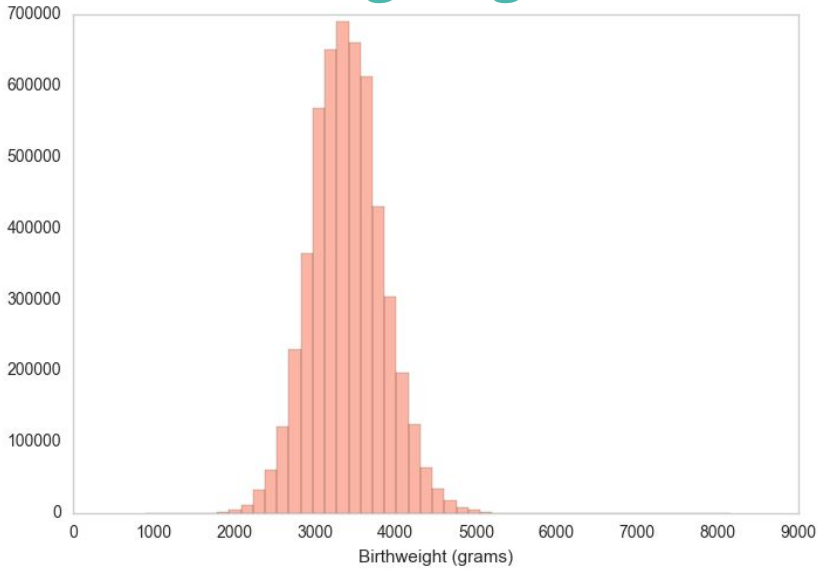
+Jolly et al (2003)
* Cheng et al (2015)

Data

U.S. National Vital Statistics

- 5.2 million live births, 2014-15
  - Single births at term
  - No major fetal anomalies
  - No major maternal risk factors
- Birthweight
  - Avg: 3403 g (Min: 750, Max: 8165)
  - Std Dev: 449 g
  - 9% > 4000 g

Birthweight (grams)

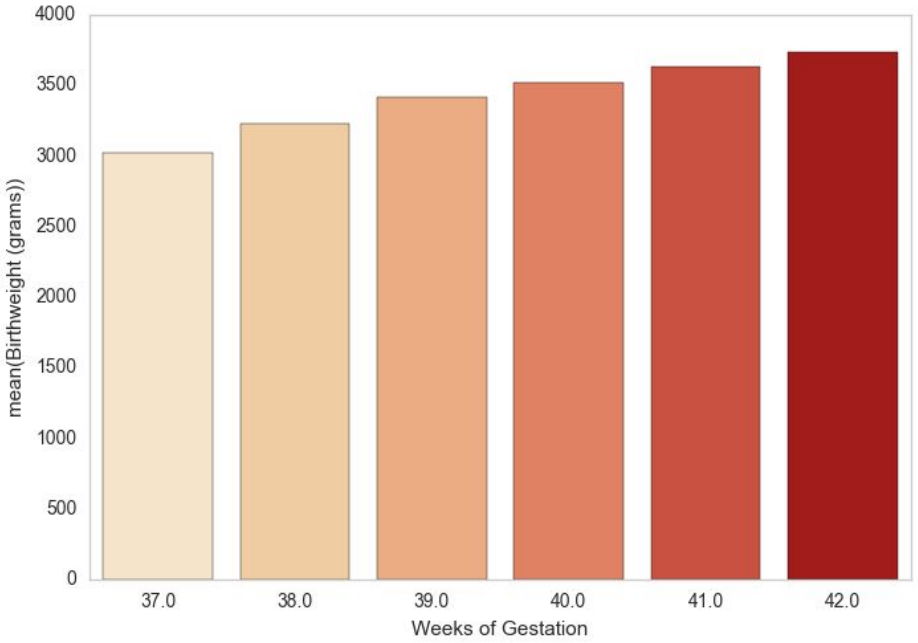


Features

- **Delivery weight**
- **Pre-pregnancy BMI**
- **Weight gain**
- **Pregnancy length (weeks)**
- Race
- Number of previous births
- Age
- Education level
- Sex of infant

These data have some limitations...

Gestation vs. Birthweight



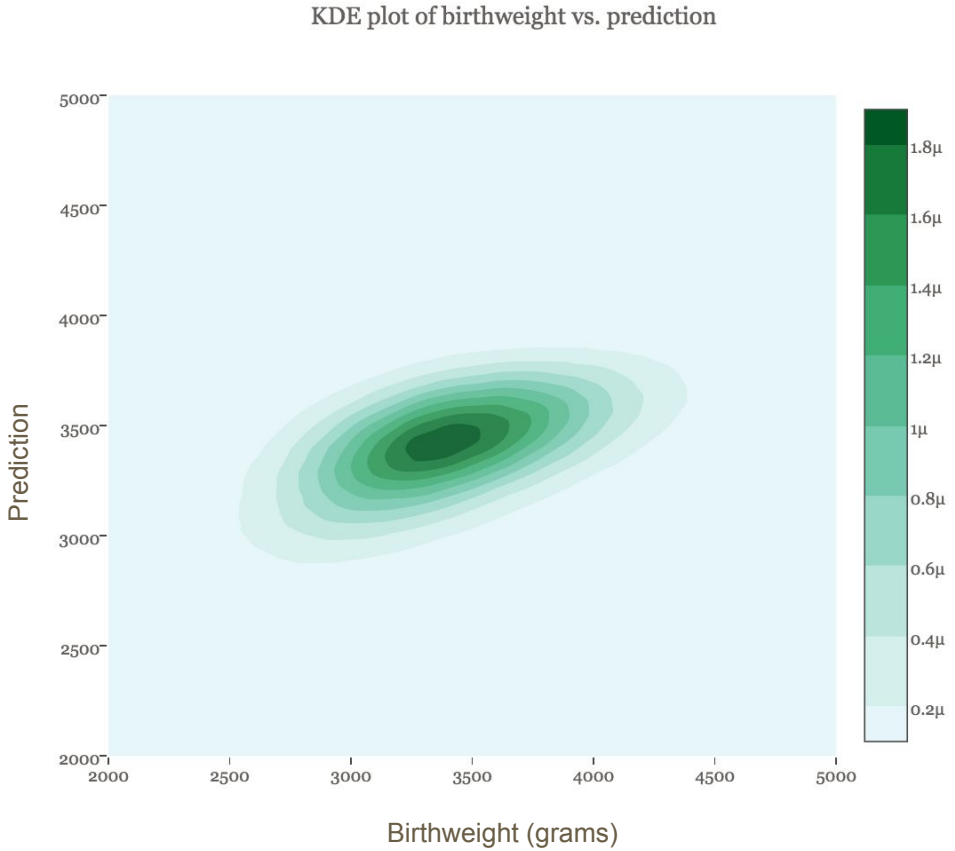
Model Results

Gradient Boosted Regression

- Mean Absolute Error: **300.7 g**
- Mean Percentage Error: **9.0%**
- Within + or - 10%: **64%**
- Within + or - 15%: **83%**

Predicting Large Babies

	True Positive Rate	False Positive Rate
U.S. Providers	.62	.28
Model	.62	.23



Takeaways

1. Results improve on U.S. medical system today

2. Greater improvement likely with more precise data

3. Potential to improve developing country birth outcomes

Thank you!

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SELECTED SOURCES

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