

# AI in Healthcare

Introduction to supervised learning

Laura Päeske

[laura.paeske@taltech.ee](mailto:laura.paeske@taltech.ee)

# Machine Learning

- ▶ Arthur Samuel (1959). Machine learning - field of study that gives computers the ability to learn without being explicitly programmed.
- ▶ Tom Mitchell (1998) Well-posed learning problem - a computer program is said to learn from experience  $E$  with respect to some task  $T$  and some performance measure  $P$ , if its performance on  $T$ , as measured by  $P$ , improves with experience  $E$

# Exercise

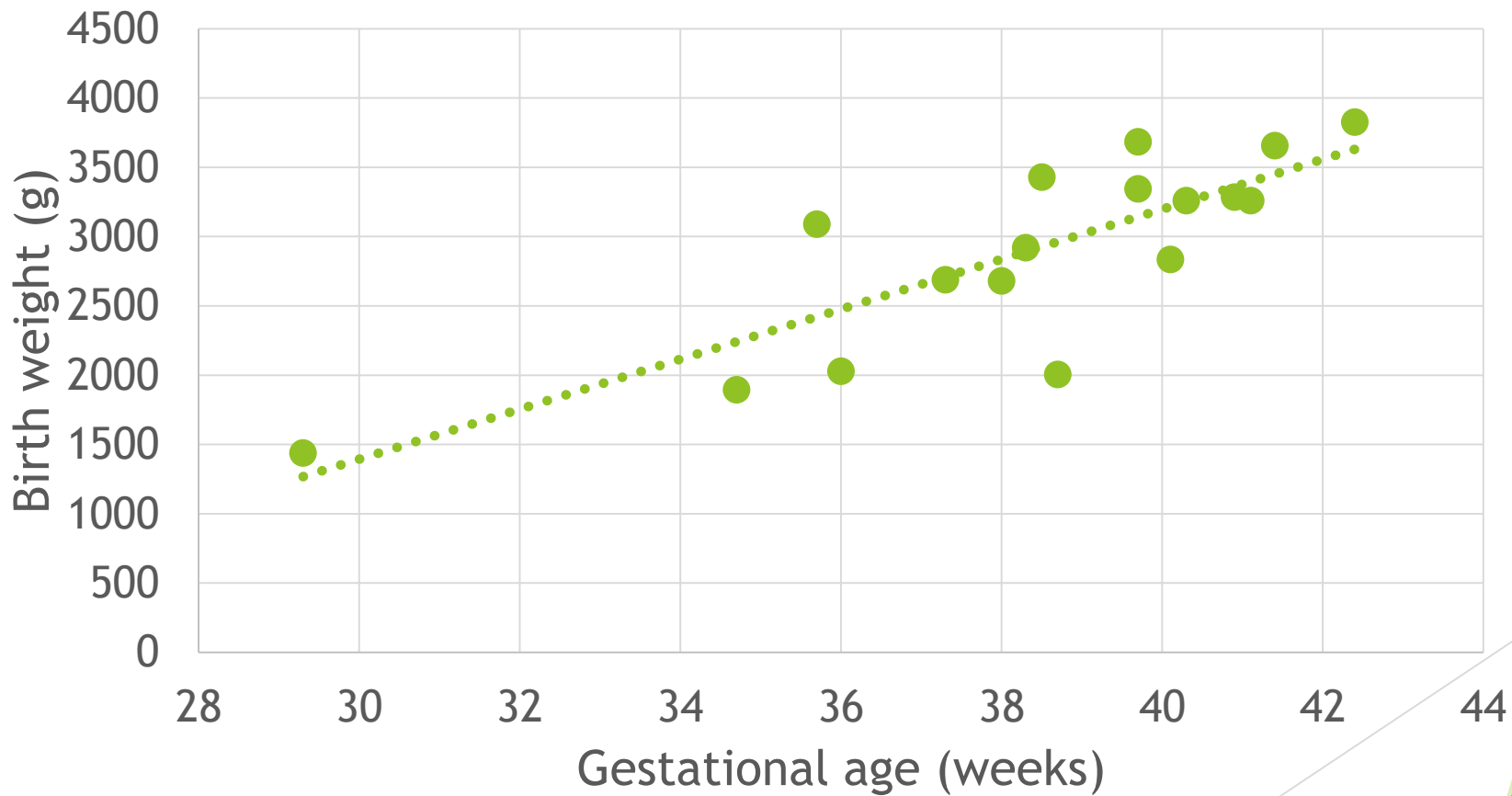
- ▶ You are creating a program that will filter your e-mails as spam or not spam according to how you have previously marked your e-mails. What is experience E, task T and performance measure P?
  - ▶ A - classifying e-mails as spam or not spam
  - ▶ B - the correct classification of the next e-mail
  - ▶ C - watching you label emails as spam or not spam
  - ▶ D - the fraction of emails correctly classified

# Supervised learning

- ▶ Supervised learning is used when labels for training data are known
  - ▶ Regression problem - predict continuous valued output
    - ▶ Example linear regression
  - ▶ Classification problem - predict discrete valued output
    - ▶ Example logistic regression

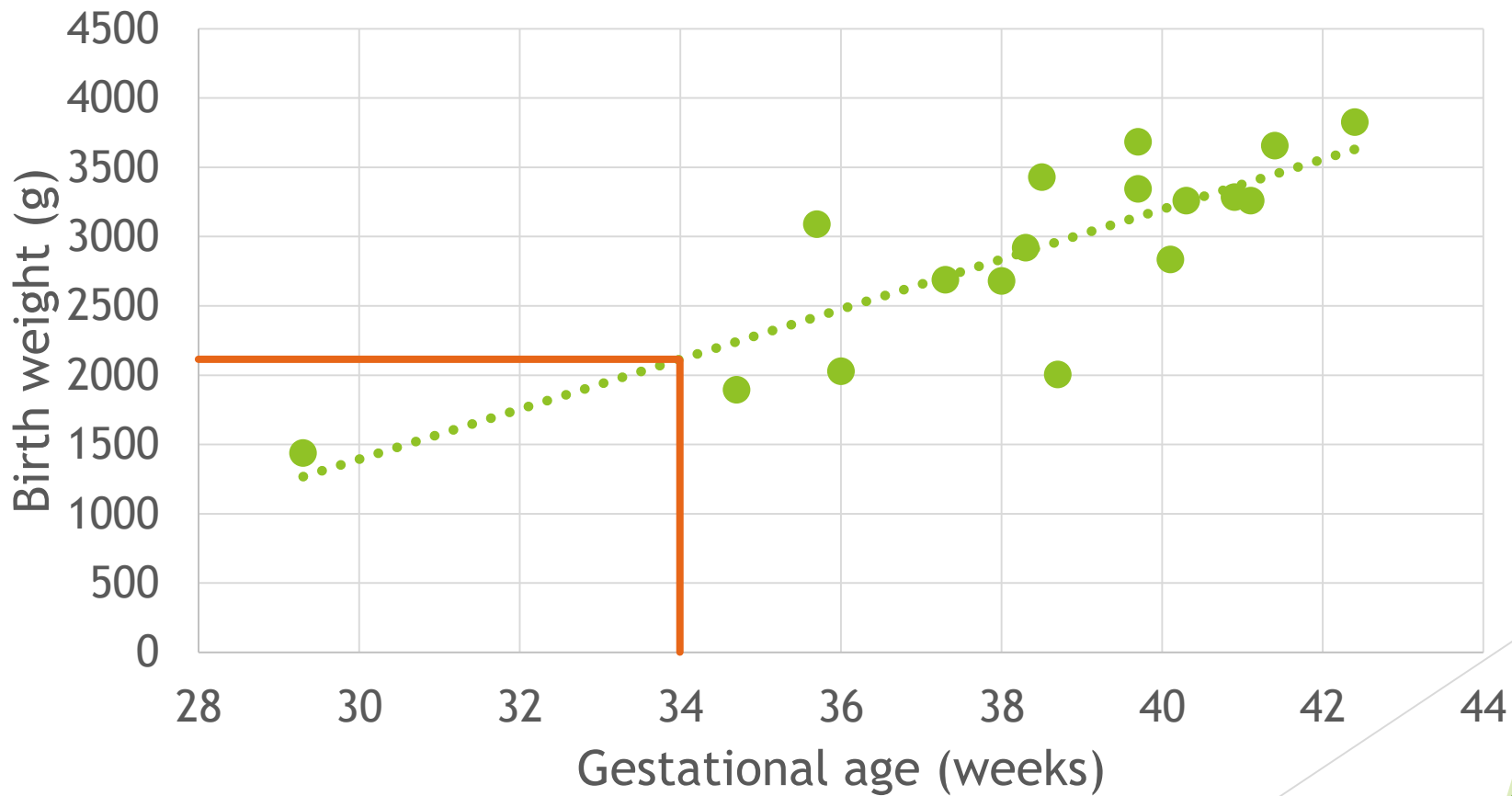
# Supervised learning: regression problem

Prediction of Birth Weight

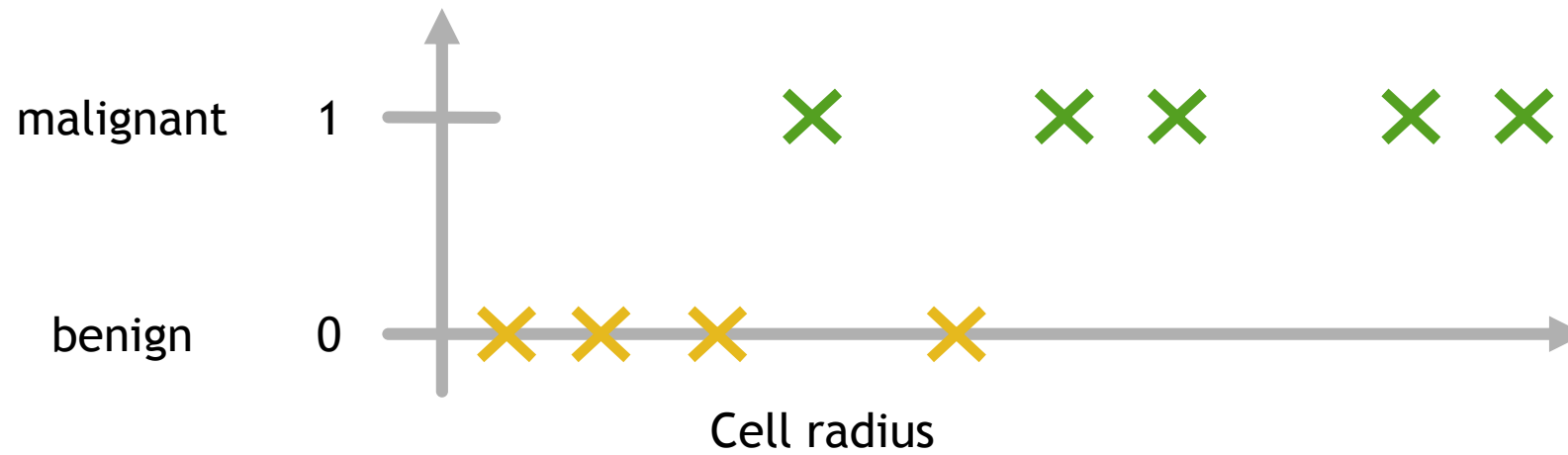


# Supervised learning: regression problem

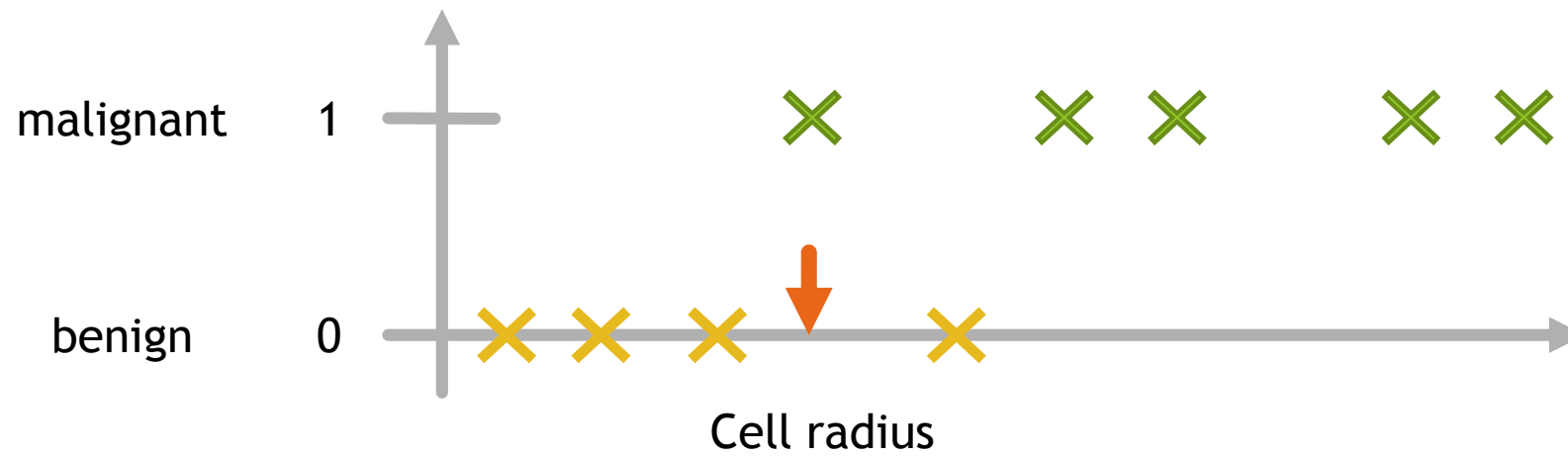
## Prediction of Birth Weight



# Supervised learning: classification problem

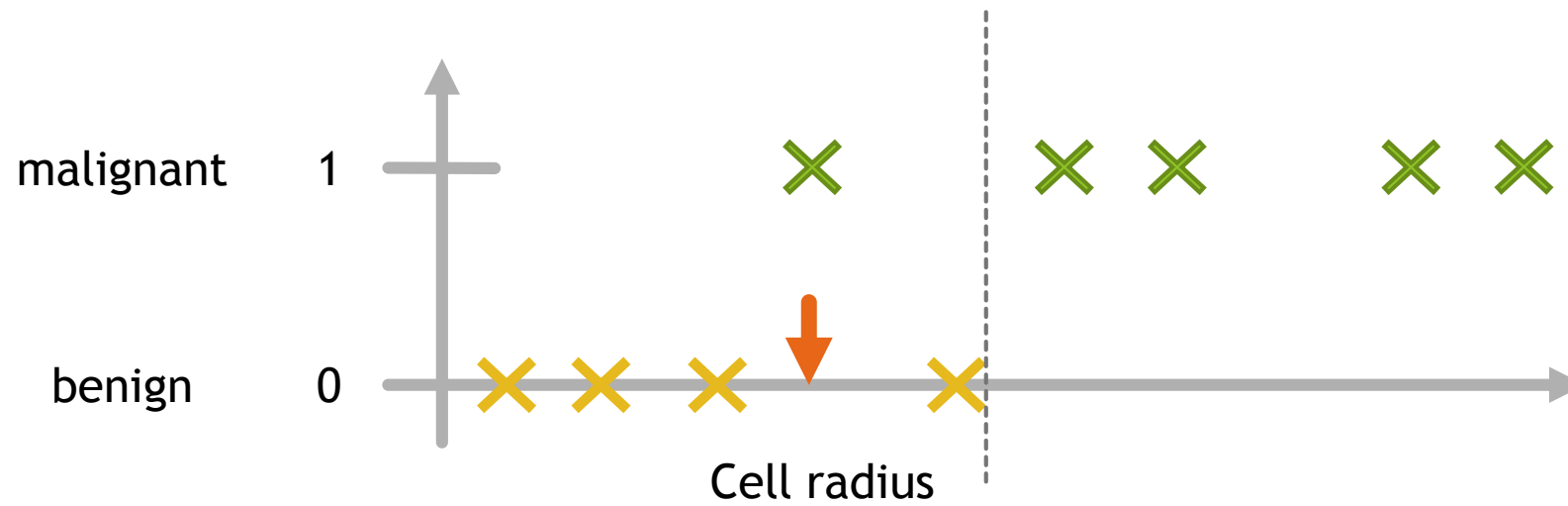


# Supervised learning: classification problem

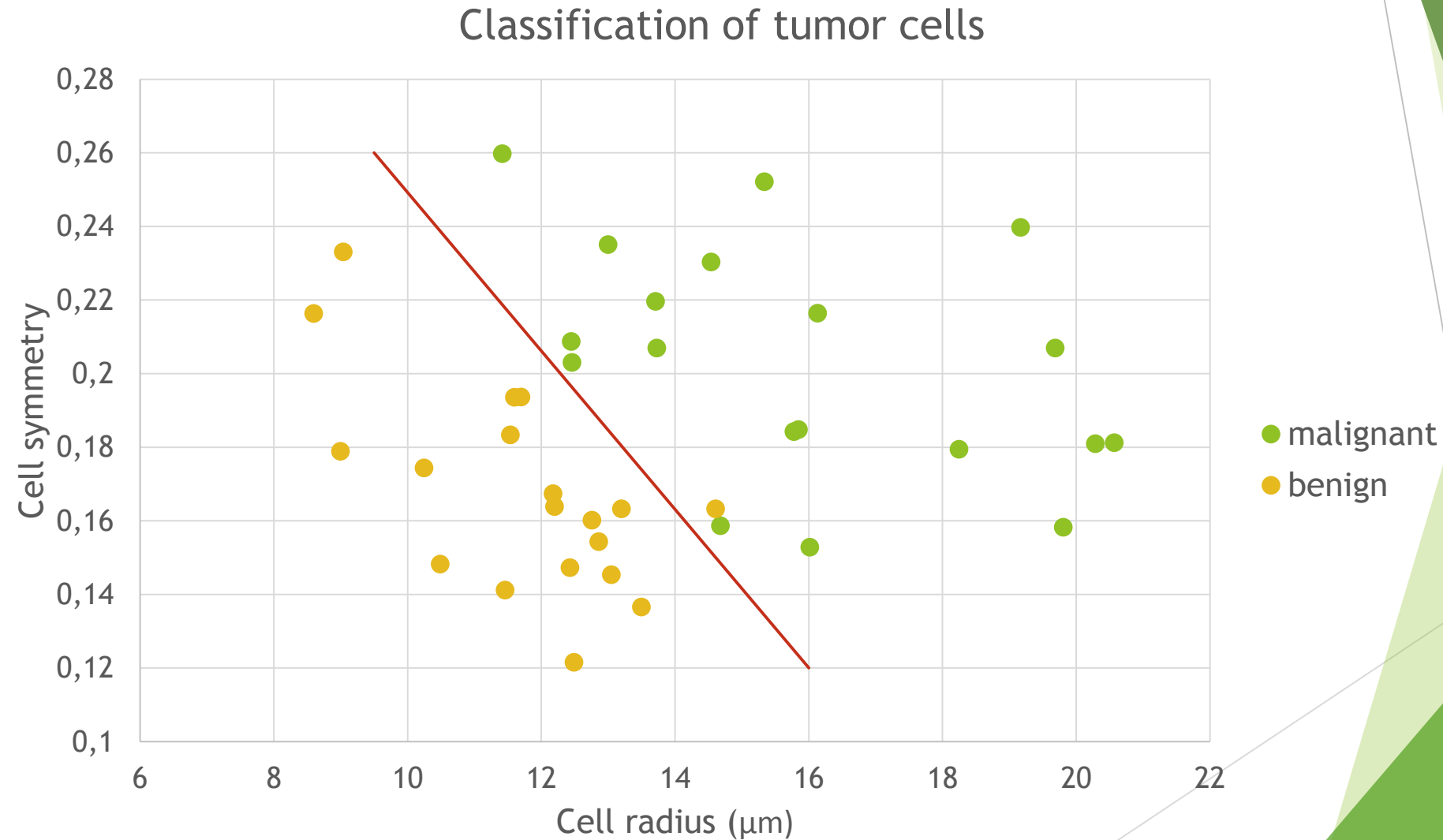




# Supervised learning: classification problem



# Supervised learning: classification problem



# Exercise

Are the following problems (a) regression or (b) classification problems?

- ▶ Problem 1: You own a candy shop and you want to know how many kilograms of candy you will sell next month.
- ▶ Problem 2: You need to create spam classifier, which decides for each incoming letter whether it is spam or not.
- ▶ Problem 3: You work in Danske Bank and you need to find accounts with money laundering suspicion.