Artificial Intelligence Club Week 2 Slides

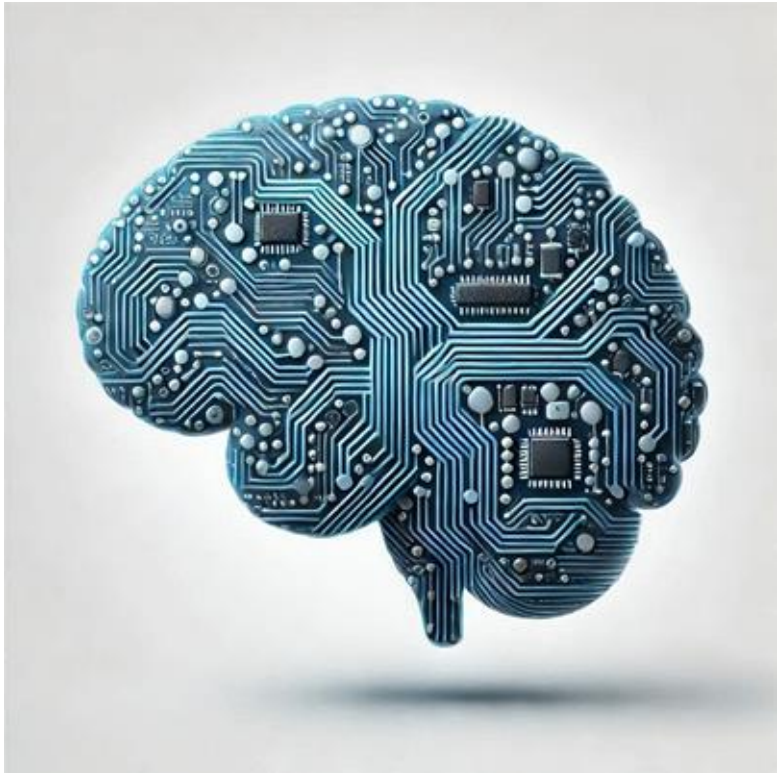
January 14th, 2026

Please try to sit together near the front!
(for activities)

Welcome!

The Artificial Intelligence Club is an interdisciplinary club, focused on all things related to Artificial Intelligence and Machine Learning

We will host meetings once a week on Wednesday 6pm - 8pm, bridging the gap between having no AI knowledge to having real experience in AI and even expertise



Overview

- Lecture Meetings - Once a week, 1hr
- Project Work - After Lecture, 1hr
- Term Projects - To Be Announced
- Special Events
  - Hackathons
  - Kaggle Competitions
  - Guest Speakers

WEBSITE

INSTAGRAM

We are stronger together!

Machine learning models make mistakes

Some models are:

- Too simple
- Too sensitive to data
- Biased in specific ways

Idea: What if we combine multiple models?

ENSEMBLES!

Each model is “okay” on its own
Together, they are much stronger

Real Life!
- Jury decisions
- Crowd-sourced reviews
- Group projects (when done well)

No new magic model, just smarter combination

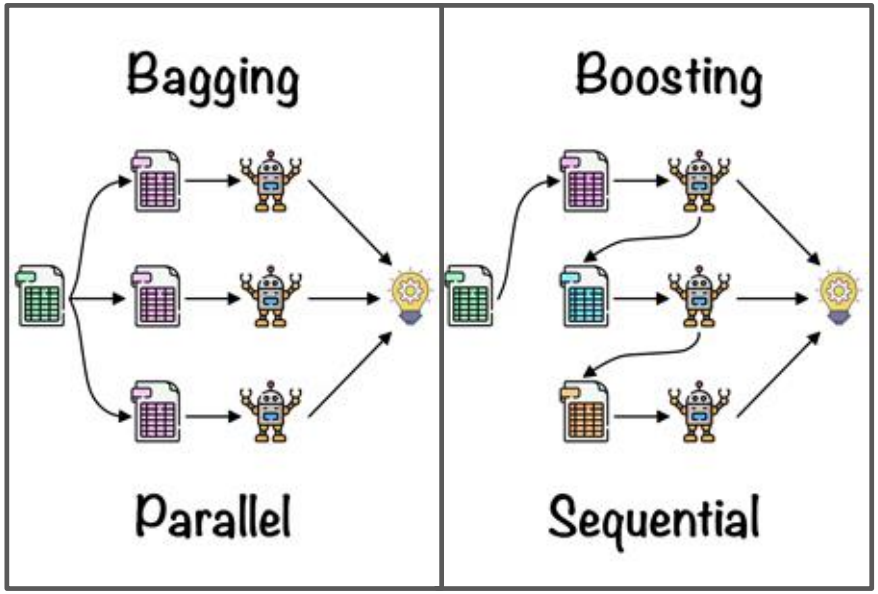
Two ways to do this

Bagging

- Many models trained independently
- Tries to reduce randomness

Boosting

- Models trained one after another
- Each model fixes previous mistakes



Bagging

Bagging trains many models separately on slightly different data and averages their predictions.

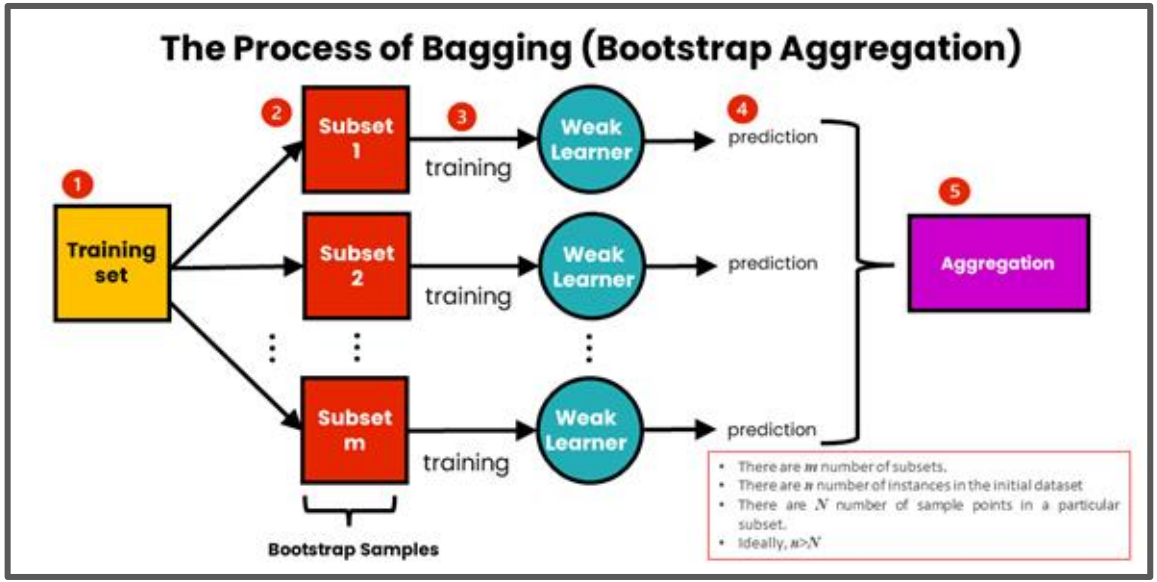
P.S. Bagging without different samples of data, is called Stacking

Key ideas:

- Same model type
- Different random samples of data
- Models do not talk to each other

Real Life!

- Ask 20 people the same question
- Everyone answers independently
- Take the majority vote



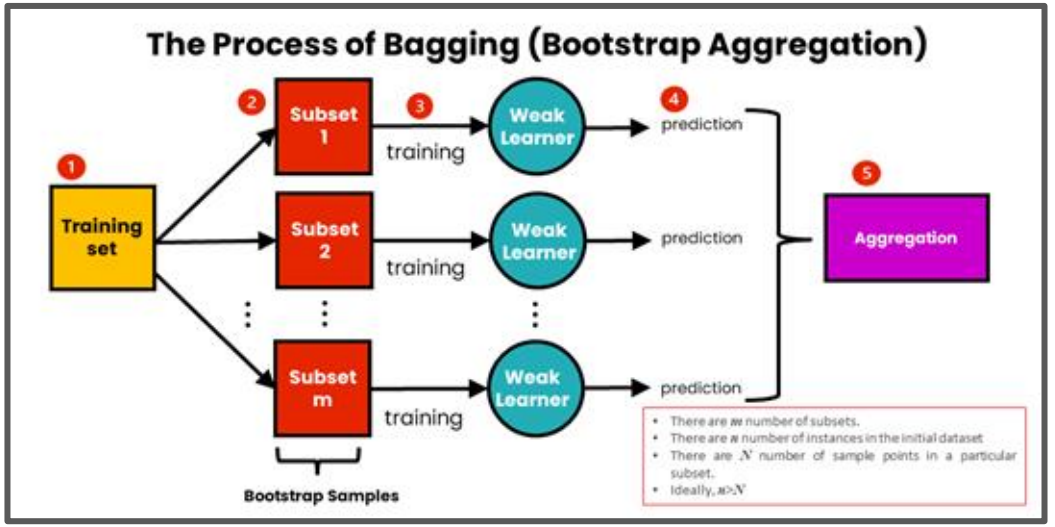
Bagging

Scenario:

- We want to detect spam emails
- We train 10 decision trees
- Each tree sees a different random subset of emails

Prediction process:

- Each tree votes: Spam or Not Spam
- Final answer = majority vote (mean)



Bagging - Activity

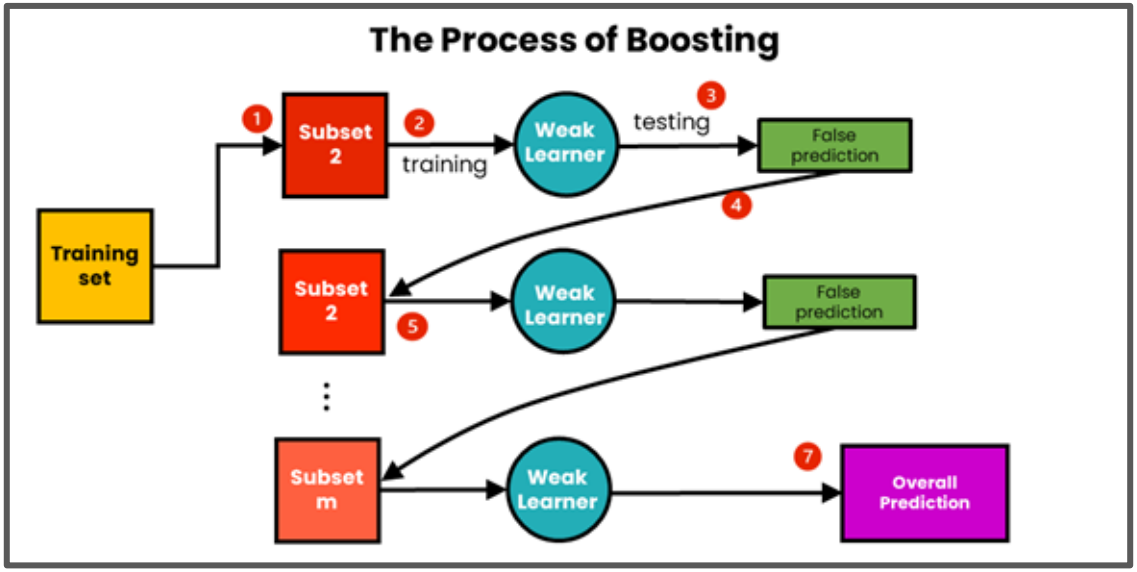
222

Boosting

Boosting trains models one after another, each one focusing on what the previous models got wrong.

Key ideas:
- Models are connected
- Later models are more focused
- Hard examples matter more

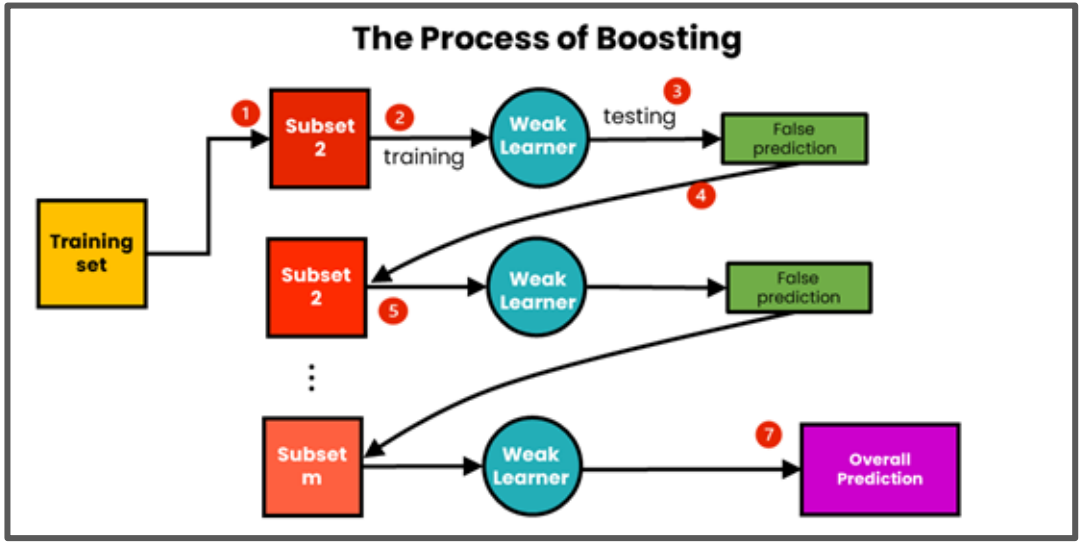
Real Life!
- Tutor helping you practice the problems you missed on the last quiz
- Going to better and better coaches as you get better at a sport



Boosting

Scenario:

- Ensemble needs to predict handwritten words
- Model 1 begins by analyzing basic patterns, but makes mistakes on messy handwriting
- Model 2 focuses more on those messy cases
- Model 3 focuses even more on the hardest cases
- Final decision combines all models and the patterns they learned



Boosting - Activity

ID	Animal	Has Fur	Has Wings	Lives in Water	Lays Eggs	Label	Model #1	Model #2	Model #3
1	Dog	Yes	No	No	No	Mammal	Mammal	-	-
2	Cat	Yes	No	No	No	Mammal	Mammal	-	-
3	Horse	Yes	No	No	No	Mammal	Mammal	-	-
4	Bat	Yes	Yes	No	No	Mammal	Mammal	-	-
5	Dolphin	No	No	Yes	No	Mammal	Not Mammal	Mammal	Mammal
6	Whale	No	No	Yes	No	Mammal	Not Mammal	Mammal	Mammal
7	Platypus	Yes	No	Yes	Yes	Mammal	Mammal	-	Not Mammal
8	Kangaroo	Yes	No	No	No	Mammal	Mammal	-	-
9	Eagle	No	Yes	No	Yes	Not Mammal	Not Mammal	-	Not Mammal
10	Penguin	No	Yes	Yes	Yes	Not Mammal	Not Mammal	Mammal	Not Mammal
11	Shark	No	No	Yes	Yes	Not Mammal	Not Mammal	Mammal	Not Mammal
12	Crocodile	No	No	Yes	Yes	Not Mammal	Not Mammal	Mammal	Not Mammal
13	Snake	No	No	No	Yes	Not Mammal	Not Mammal	-	-
14	Lizard	No	No	No	Yes	Not Mammal	Not Mammal	-	-
15	Frog	No	No	Yes	Yes	Not Mammal	Not Mammal	Mammal	Not Mammal
16	Chicken	No	Yes	No	Yes	Not Mammal	Not Mammal	-	Not Mammal

Why Ensembles Matter

Examples:

- Kaggle competitions
- Fraud detection
- Medical diagnosis
- Recommendation systems

Most real AI systems use ensembles, not single models.

Feedback?

Survey