



ENSEMBLE LEARNING

1. ค. ฝึกหัดสร้าง base model
(SL)

2. หา material อ่านหา (Book)


ENSEMBLE LEARNING

What is ensemble learning?

Type of ensemble learning

Comparison

Further reading

A small green seedling with several leaves is growing out of a crack in a dark, textured asphalt surface. The background is a blurred, light-colored sky.

WHAT IS ENSEMBLE LEARNING?

multiple var base model



model จะต้องมี ค. ความสัมพันธ์ (correlation)
ต่าง กัน



predictive pe —

var ↓



ENSEMBLE LEARNING IS A TECHNIQUE IN MACHINE LEARNING WHERE **MULTIPLE MODELS** ARE COMBINED TO IMPROVE PREDICTIVE PERFORMANCE COMPARED TO INDIVIDUAL MODELS.

THIS APPROACH LEVERAGES THE STRENGTHS AND COMPENSATES FOR THE WEAKNESSES OF VARIOUS MODELS, **RESULTING IN HIGHER ACCURACY AND RESILIENCE.**

Type of ensemble learning



Bagging



Boosting



Stacking

COMPARISON



Comparison



| | Bagging | Boosting | Stacking |
|--------------------|--|---|--|
| Purpose | Reduce variance | Reduce bias | Combine multiple models to improve predictive performance |
| Combination method | Averaging or voting | Weighted voting | Meta-learner (stacker) combines predictions of base models |
| Performance | Improves stability and accuracy by averaging out noise | Improves accuracy by focusing on difficult-to-predict instances | Often outperforms individual models by leveraging their strengths |
| Model training | Trains models independently | Trains models sequentially, each focusing on errors of the previous | Trains models independently first, then trains a meta-learner on their predictions |
| Handling noise | More robust to noisy data | Sensitive to noisy data and outliers | Can mitigate overfitting by using a diverse set of base models |

Comparison



| | Bagging | Boosting | Stacking |
|------------------------|---|---|---|
| Complexity | <ul style="list-style-type: none">- Easier to implement- simpler computation | <ul style="list-style-type: none">- More complex implementation- higher computational cost | <ul style="list-style-type: none">- Most complex to implement- requires careful selection- training of base models and meta-learner |
| Overfitting | Less prone to overfitting | Can overfit, especially with noisy data | Prone to overfitting if base models or meta-learner are not properly regularized |
| Weak learners | Can use any models as base learners, including strong and weak learners | Uses weak learners and iteratively improves them | Can use any models as base learners, including strong and weak learners |
| Hyperparameters tuning | Requires tuning of fewer hyperparameters | Requires careful tuning of hyperparameters | Requires tuning of both base models and the meta-learner |

FURTHER READING

A close-up, slightly blurred photograph of a person's hands holding an open book. The book is open to two pages of text, and the person's fingers are visible holding the edges. The background is dark and out of focus. The text 'FURTHER READING' is overlaid in large, white, bold, sans-serif capital letters in the upper left quadrant.

Machine Learning & Pattern
Recognition Series – Ensemble
Learning Foundations and
Algorithms



THANK YOU
