Supervised Machine Learning

Ensemble Method

Instructor, Nero Chan Zhen Yu

Forward School

What is Ensemble Learning

Ensemble learning techniques attempt to make the performance of the predictive models better by improving their accuracy.

Ensemble Learning is a process using which multiple machine learning models (such as classifiers) are strategically constructed to solve a particular problem.

Forward School

Case Study of Ensemble Learning

Suppose, you want to invest in a company XYZ. You are not sure about its performance though. So, you look for advice on whether the stock price will increase by more than 6% per annum or not? You decide to approach various experts having diverse domain experience:

- **Employee of Company XYZ – 70%**
- **Financial Advisor of Company XYZ- 75%**
- **Stock Market Trader – 70%**
- **Employee of a competitor – 60%**
- **Market Research team in the same segment- 75%**
- **Social Media Expert – 65%**

Forward School

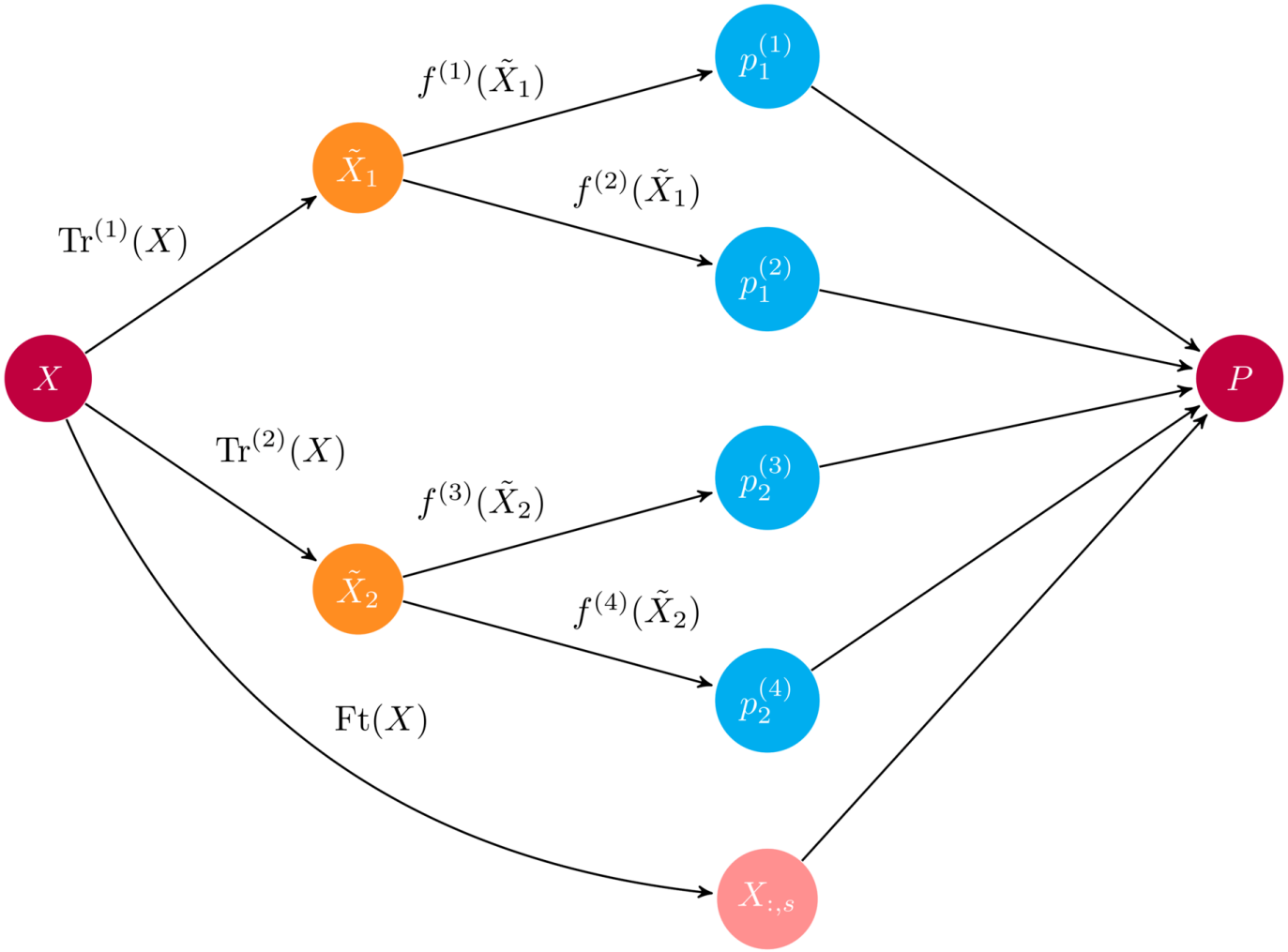
Ensemble Learning

Let’s now understand how do you actually get different set of machine learning models. Models can be different from each other for a variety of reasons:

- There can be difference in the population of data.
- There can be a different modeling technique used.
- There can be a different hypothesis.

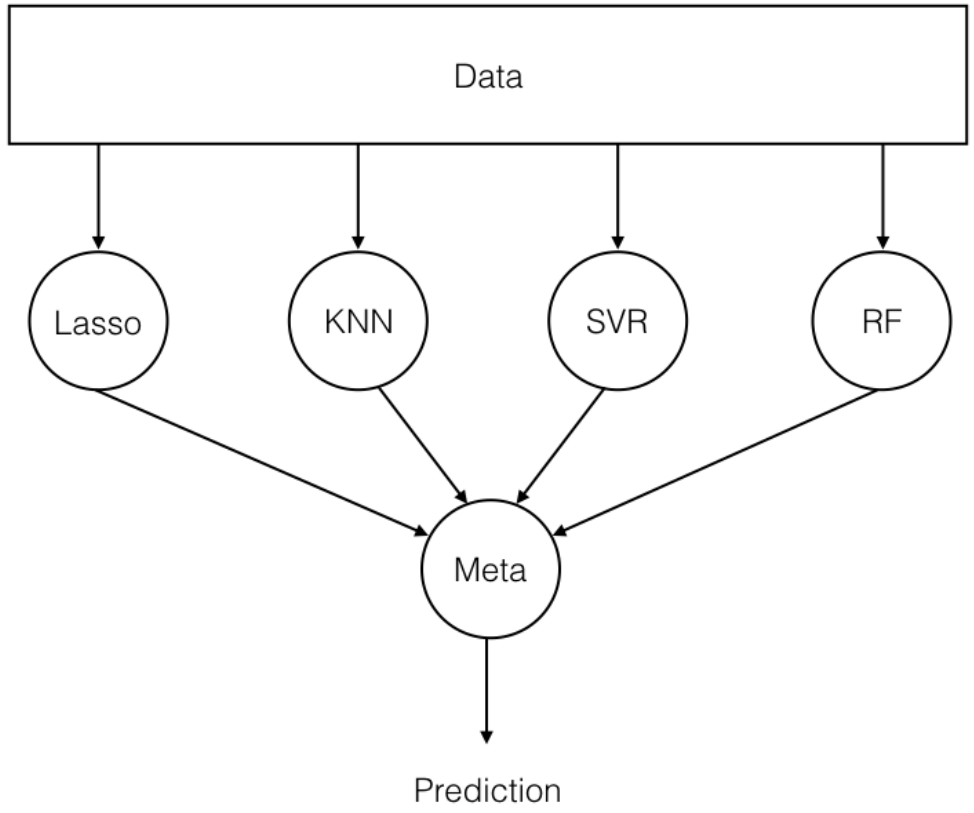
Forward School

Ensemble Learning



Forward School

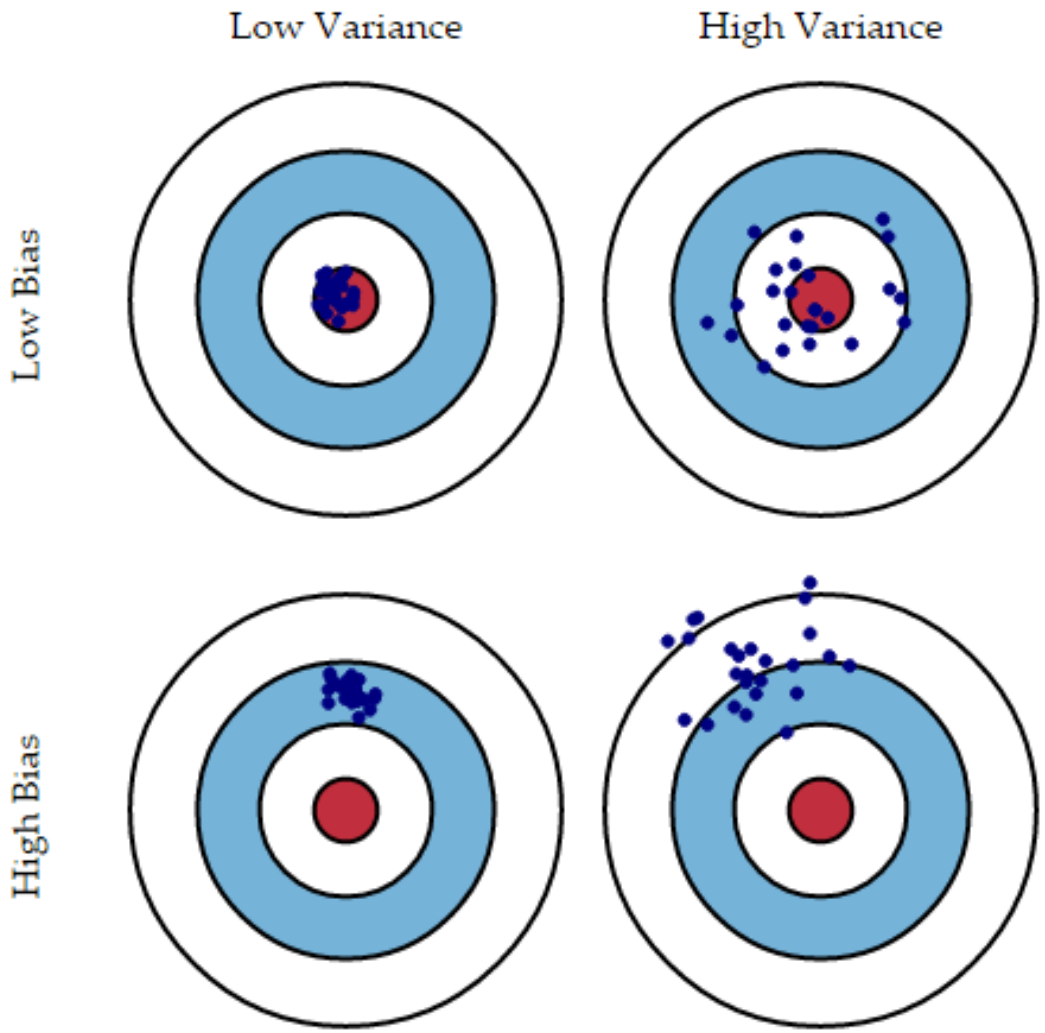
Ensemble Learning Structure



Forward School

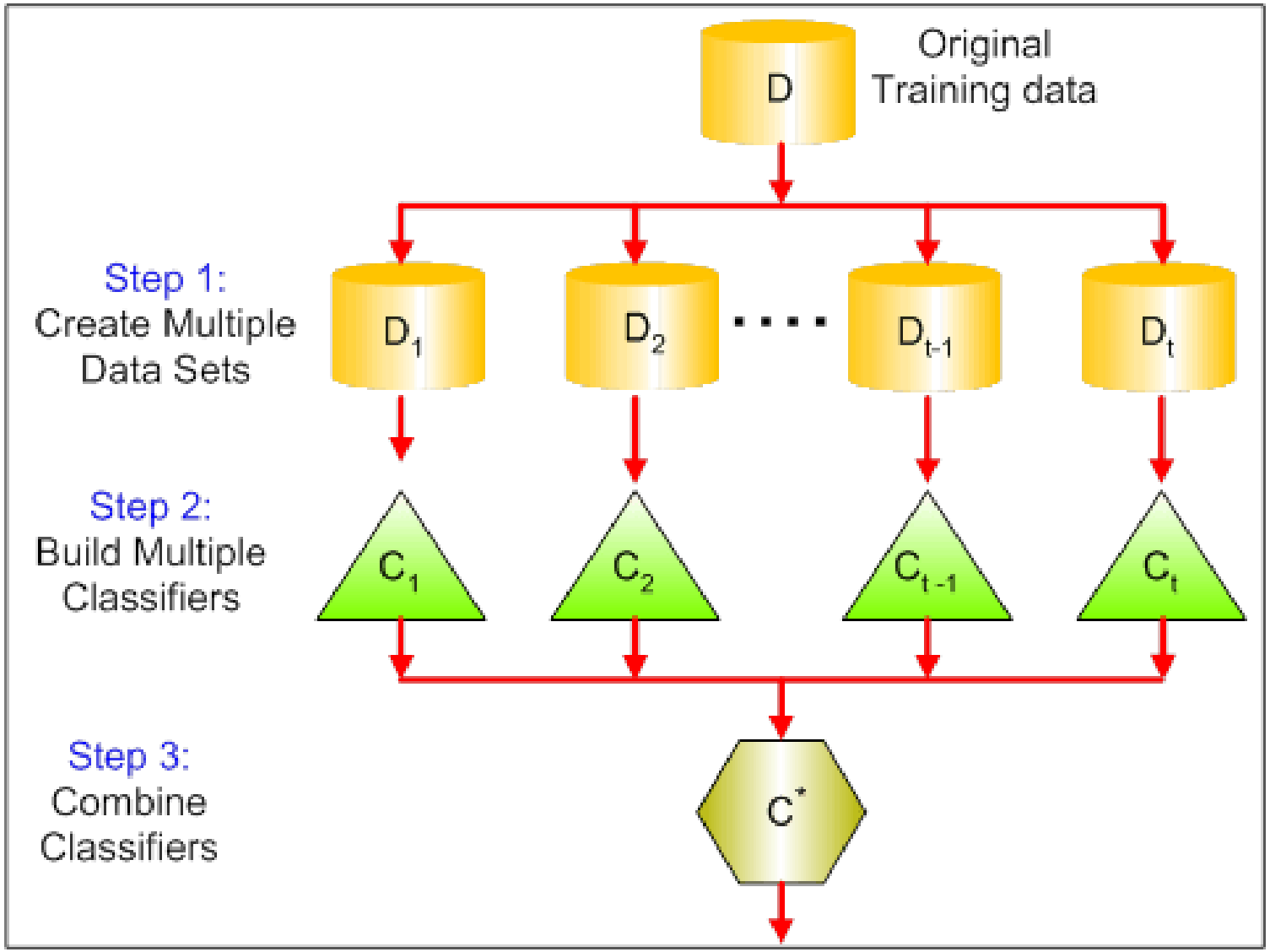
Model Error

- Bias + Variance + Irreducible error



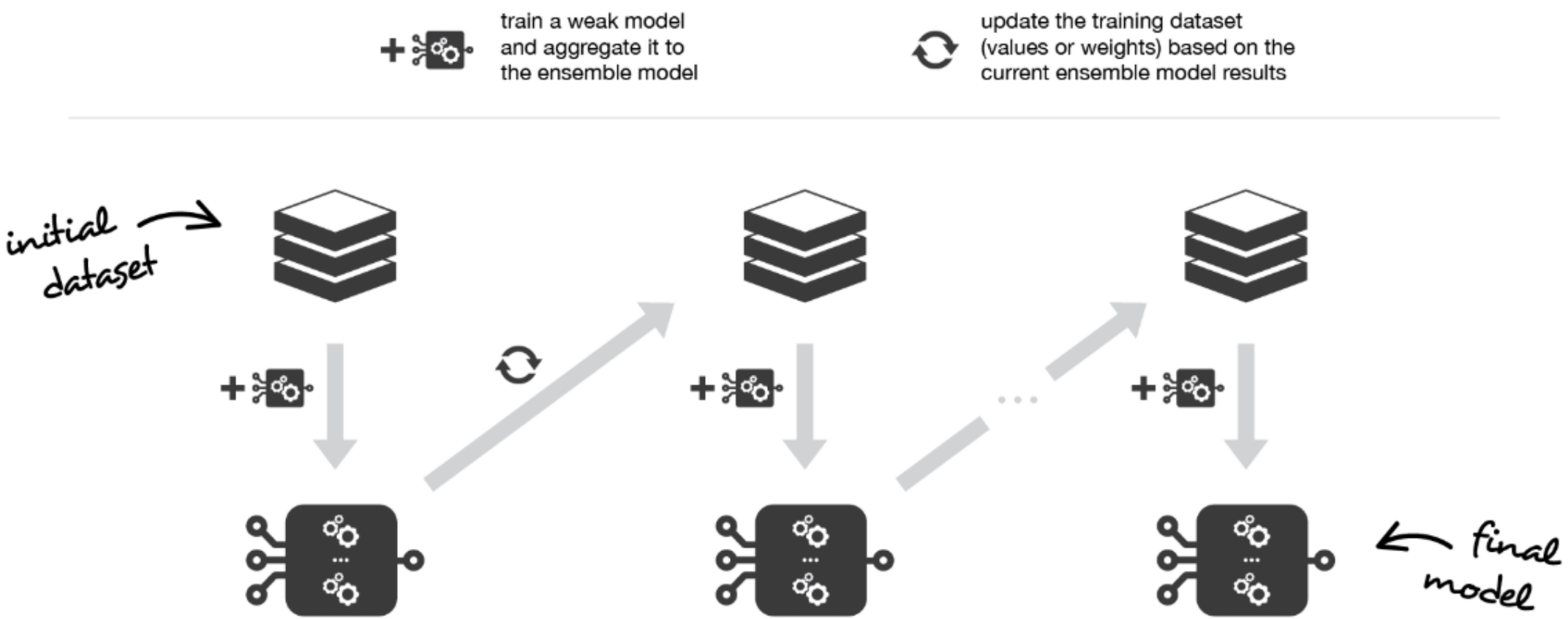
Forward School

Bagging based Ensemble learning



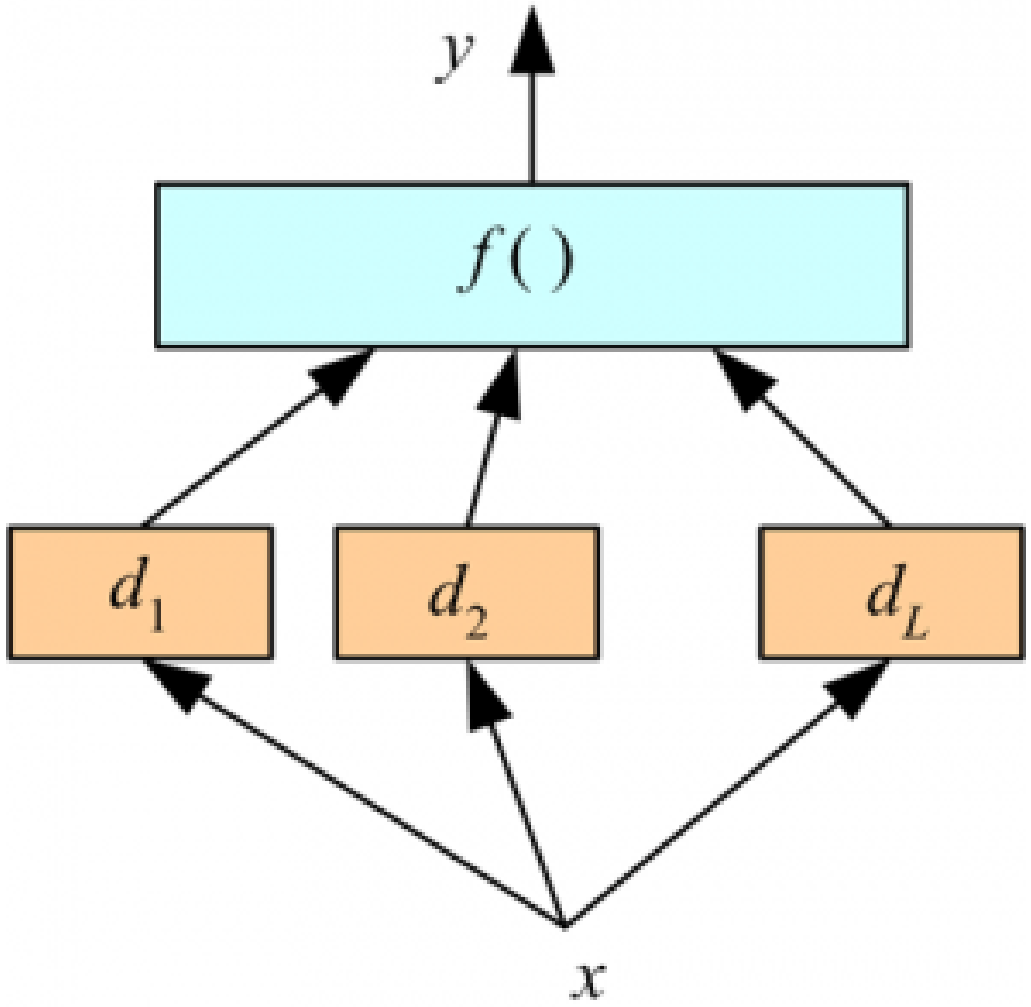
Forward School

Boosting-based Ensemble learning:



Forward School

Voting based Ensemble learning



Forward School

Pitfalls of Ensemble Learning

Forward School