



The secret weapon: Ensembles

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Forecasting Analytics

Instead of choosing: combine!

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Netflix Prize

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Movies For You

Randy, the following movies were chosen based on your interest in:
[Bowling for Columbine](#)
[Carnivale: Season 1](#)
[Fahrenheit 9/11](#)

The Big One
★★★★☆
A rivetingly creative and subversive series containing a motley crew of characters who've made the world a better place. Read More

Carnivale: Season 2
★★★★☆
Disc Series

Red Eye
★★★★☆
In this biographical satire...

You really liked it...
Now owned for just \$5.99
Shop as low as \$5.99

Welcome!

The Netflix Prize seeks to substantially improve the accuracy of predictions about how much someone is going to love a movie based on their movie preferences. Improve it enough and you win one (or more) Prizes. Winning the Netflix Prize improves our ability to connect people to the movies they love.

Read the [Rules](#) to see what is required to win the Prizes. If you are interested in joining the quest, you should [register a team](#).

You should also read the [frequently-asked questions](#) about the Prize. And check out how various teams are doing on the [Leaderboard](#).

Good luck and thanks for helping!

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Ensembles

Combine forecasts from different methods

Combine forecasts from multiple series
measuring the same phenomenon (weather)

Multi-level models: fit one method to another
method's forecast errors

Combine forecasts by (weighted) **averaging**

Weights proportional to method
performance / data reliability

Weights obtained via regression

Dynamic weights

Forecasting experts answer: (forecastingprinciples.com FAQ)

“What are the disadvantages of combined forecasts?”

- a)* Increased costs
- b)* Need analysts who are familiar with a number of methods
- c)* Need to ensure that a pre-determined rule for combining is agreed upon. Otherwise, people can find a forecast to suit their biases.

“Why isn’t it common to use combined forecasts?”

- a)* It is counter-intuitive. People think you only get an average forecast and they believe that if they can pick a method, they will do better. (This explanation has been supported by experiments).
- b)* This solution is too simple. People like complex approaches.

The scientific truth about ensembles

More robust forecasts

Higher precision



"Consensus Forecasting Using Relative Error Weights"

by Lackman & Brandon

in *Marketing Intelligence & Planning* 1994

A weighting scheme that assigns greater weight to models that produce smaller errors

$$W_{A,t} = \frac{\text{MSE}_{B,t} \div \text{SD}_{B,t}}{(\text{MSE}_{A,t} \div \text{SD}_{A,t}) \div (\text{MSE}_{B,t} \div \text{SD}_{B,t})} \quad (1)$$

Period	Actual	10-period holdout sample					
		Model A		Model B		Combined	
		Forecast	Square error	Forecast	Square error	Forecast	Square error
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
5	2,064	2,125	3,721	2,272	43,264	2,164	10,000
6	2,386	2,106	78,400	2,464	6,084	2,266	14,400
7	2,432	2,116	99,856	2,517	7,225	2,241	36,481
8	2,542	2,386	24,336	2,722	32,400	2,529	169
9	2,663	2,513	22,500	2,804	19,881	2,655	64
10	2,767	2,597	28,900	2,919	23,104	2,765	4
11	2,896	2,728	28,224	3,017	14,641	2,836	3,600
12	2,014	2,849	2,722	3,032	324	2,984	900
13	3,146	2,964	33,124	3,107	1,521	3,088	3,364
14	3,015	3,135	<u>14,400</u>	3,147	<u>17,424</u>	3,146	<u>17,161</u>
Mean square error			36,069		16,587		8,614