The average as an equalizer

Suppose that there are four people who have $1, $2, $3, and $4 respectively.

You can use the basic definition to work out that the the average amount of money that the four people have is $2.50 per person.

The people didn’t all have the same amount to start with. The average took the total pot of money (which is $10) and split it equally among them. So the average can be thought of as an equalizing or smoothing operation.

You can do the equalizing in another way. Take each person’s cash and split it four ways. Then the people contribute respectively 25 cents, 50 cents, 75 cents, and one dollar. Add those up and you get $2.50, the old average.

Changing an entry

Now you can see quite easily what happens when one person comes into some more money. For example, suppose the fourth person gets a windfall of $100. That person now has $104 instead of $4.

Does this affect the average? Yes, the average goes up.

By how much? Well, you could re-compute the average with the new numbers. But you don’t have to do that. The additional $100 will be split four ways as well, so the average will go up by $25.

Check: by the basic formula, the average of the new list is $110/4 = $27.5. That’s $25 more than the old average.

Any change in an entry in the list will change the average.

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\text{change in the average} = \frac{\text{change in the entry}}{\text{number of entries in the list}}
\]

The good thing about this method is that you don’t have to know much about the list in order to use it. You certainly don’t need the entire list. You don’t even need the old average. All you need are the change in the entry, and the number of entries in the list.

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