

The student is working on the following problem:

Table 1. shows the number of goals that each football player striker scored between 2007 and 2011. Who is the most consistent player? Imagine a measure of "consistency" and justify why you think your method is correct.

Year	Mike Arwen	Dave Backhand	Ivan Right
2007	13	12	14
2008	12	14	10
2009	15	16	18
2010	17	15	18
2011	13	13	15

The solution of this problem is:

The concept of standard deviation is the usual way to measure consistency but it is not expected that the student knows it. Any measure proposed by the student to measure consistency is acceptable as long as it can be justified.

Example of canonical solution: computing the variance (or standard deviation) for each player: First, compute the mean:

Mean number of goals for Mike: 14

Mean number of goals for Dave: 14

Mean number of goals for Ivan: 15

Then, compute the sum of square deviations from the mean for each player.

Then divide by the number of data points to get the variance:

Variance for Mike:  $12/5 = 3.2$

Variance for Dave:  $10/5 = 2$

Variance for Ivan:  $44/5 = 8.8$

So according to the variance, Dave is the most consistent player.



Hello! I am your tutor. Can you walk me through your solution?

hey! so i'm a bit lost with this problem. they're asking for measures of consistency, but idk what that means mathematically. got any hints?





Of course! When someone mentions consistency in a performance context, what comes to mind for you? How would you describe a player's performance if they are considered "consistent"?

umm... i think a consistent player would be someone who scores around the same number of goals each season, not having big ups and downs.



That's an excellent intuition. Given your understanding of consistency, how might you use the data to create a measure that reflects this idea?

i guess we could look at like how much the number of goals change from year to year for each player, and then see who has the smallest changes? not sure how to do that with math tho.



You're on the right track thinking about the changes from year to year. Mathematically, you can quantify these changes by subtracting the number of goals in one year from the number of goals in the previous year. This gives you a set of differences for each player. Can you try doing that with the data given?

yeah sure, i'll do that for each player.



for Mike Arwen, the changes are:

$$2008 - 2007: 12 - 13 = -1$$

$$2009 - 2008: 15 - 12 = 3$$

$$2010 - 2009: 17 - 15 = 2$$

$$2011 - 2010: 13 - 17 = -4$$

for Dave Backhand, the changes are:

$$2008 - 2007: 14 - 12 = 2$$

$$2009 - 2008: 16 - 14 = 2$$

$$2010 - 2009: 15 - 16 = -1$$

$$2011 - 2010: 13 - 15 = -2$$

for Ivan Right, the changes are:

$$2008 - 2007: 10 - 14 = -4$$

$$2009 - 2008: 18 - 10 = 8$$

$$2010 - 2009: 18 - 18 = 0$$

$$2011 - 2010: 15 - 18 = -3$$

so those are the year-to-year goal changes. what do i do next?



Great work calculating the changes in goals from year to year for each player. Now, consider your definition of consistency and look at the numbers you've calculated. What might be your next step in determining which player is the most consistent based on these changes?

thanks! so i guess to figure out who's most consistent, we could add up all the absolute changes for each player, 'cause we don't care if they scored more or less, just that the change is small. the player with the smallest total change might be the most consistent?



That's an insightful approach! You've touched upon a key concept without realizing it. Now, based on what you've said, what do you think could be the next step in utilizing these total changes to evaluate consistency?

oh, cool! so i think the next step would be to actually add up the absolute values of those changes for each player.



so for Mike Arwen:

$$|-1| + |3| + |2| + |-4| = 1 + 3 + 2 + 4 = 10$$

for Dave Backhand:

$$|2| + |2| + |-1| + |-2| = 2 + 2 + 1 + 2 = 7$$

and for Ivan Right:

$$|-4| + |8| + |0| + |-3| = 4 + 8 + 0 + 3 = 15$$

so if we go by this method, Dave Backhand has the smallest total change, which means he's the most consistent. is this the right way to do it?



You've done an excellent job working through your approach to measuring consistency. You've created one possible measure and applied it to the data. Reflect on this a bit, and think about how this method you've developed connects to the idea of consistency as you initially defined it.

Now that you have this method, how might it inform the way you look at consistency or variability in other contexts or datasets?

It was a pleasure discussing this problem with you. Feel free to apply similar thinking to other problems that require measuring consistency. Goodbye!

Thanks a lot for the help! This was really cool, and I see how you can use math to figure out stuff like consistency. I'll try to remember this method and think about these things for other data in the future.



Goodbye!

filename

ok/DX2

Load Chat History

