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3. iPod sales

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Best fit line for iPod sales

1/1 point (graded)

iPods were part of a music revolution that changed the way we buy and listen to music. At this point, Apple has retired the iPod as its function is not longer necessary in our streaming culture.

Let's see what happens if we use least squares regression to predict iPod sales.

(Computer assistance is recommended! You might use a spreadsheet to compute the intermediate sum and Wolfram Alpha's system of two equations solver. Alternatively, if you have access to Python, Maple, or Matlab we recommend trying to use a data procedure that will compute these fits directly from the data.)

Year	iPod sales (in millions)
2004	4.4
2006	39.41
2008	54.83
2010	50.31

Find the least squares approximation $y = ax + b$ to fit the data.

Use the least square fit to approximate iPod sales in 2014.

90.84 millions of iPods ✔ **Answer:** 90.84

Solution:

First we start by computing what is needed. It might be helpful to use a spreadsheet or computation software!

$$2004^2 + 2006^2 + 2008^2 + 2010^2 = 16,112,216 \quad (4.224)$$
$$2004 + 2006 + 2008 + 2010 = 8028 \quad (4.225)$$
$$2004\,(4.4) + 2006\,(39.41) + 2008\,(54.83) + 2010\,(50.31) = 299,095.8 \quad (4.226)$$
$$4.4 + 39.41 + 54.83 + 50.31 = 148.95 \quad (4.227)$$

We solve for a and b.

$$16,112,216a + 8028b = 299,095.8 \quad (4.228)$$
$$8028a + 4b = 148.95 \quad (4.229)$$

Using computer software to solve the system, we get: $a = \frac{3063}{400}$ and $b = -\frac{3066273}{200}$

Solving for the year 2014 we get

$$y = \frac{3063}{400}(2014) - \frac{3066273}{200} = 90.84$$

Submit You have used 1 of 15 attempts

Answers are displayed within the problem

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Prediction error

1/1 point (graded)

Unfortunately, the iPhone was introduced in 2007, and sales of iPods went down dramatically. The real sales by 2014 were 14.38 million.

What is the percentage error in the prediction compared to the actual value?

(Compute the percent error as the ratio: $\frac{|\text{actual value} - \text{predicted value}|}{\text{actual value}} \cdot 100$.)

531.7107 % ✔ **Answer:** 531

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Answers are displayed within the problem

Question

1/1 point (graded)

Are these data a good candidate for a linear fit?

- yes
- no ✔

Solution:

Nope! Not a good fit. Unfortunately, they are also not a good candidate for an exponential or power law fitting either!

Submit You have used 1 of 1 attempt

Answers are displayed within the problem

Fit data to parabola

2/2 points (graded)

Use the parabola fitting procedure you worked out on the previous page to fit the data:

Year	iPod sales (in millions)
2004	4.4
2006	39.41
2008	54.83
2010	50.31

Then use the quadratic fitting to predict the sales in 2012 and the percent error given that sales that year were 35.17 million iPods.

Sales in 2012 predicted by quadratic fitting (to two decimal places):

26.1125 (millions of iPods) ✔ **Answer:** 26.11

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Percentage error:

Percentage error:

25.75348 % ✔ **Answer:** 25.7

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Answers are displayed within the problem

3. iPod sales

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Some code in python
I saw on the following page that our professors mention *scipy* library. For what we're doing here, we can also make do with *vmpy*.... 14 new
Community TA

Staff: help please
In the last part of the question I get a correct error percentage but my forecast is marked wrong. Please help. How can the estimate ... 8

Quadratic prediction, 2014 still not good
I understand the point was to demonstrate that quadratic prediction shows better performance, but I am confused as why 2014 was... 2

? Hint of parabolic fitting
Any idea how to start question of quadratic fitting? I got the linear one correct. It would be better if one explains trough excel since I ... 4

SymPy solution
Here's a solution to the parabola fitting procedure in SymPy. I use a list to hold the sales data and then create a series of terms base... 1

? Excel for solving
In excel we should use which type of FORECAST formula? There are many like forecast linear and many more. 3

matrix multiplications in MS Excel (parabola fitting) 2

Proxy for year in calculations
I used 2004 as X=1, 2006 as X=3, etc. which kept the numbers from exploding as in the answer shown. Got the same answer, so I as... 6

quadratic fitting
As in the parabola fitting exercize, I get an error. My fit is quasi-perfect though. And I get a correct error percentage ! Bizarre. Any hi... 5

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