

Moving pictures: teach speed, acceleration, and scale with photograph sequences

How fast is that car moving?

Below is an example of how a picture sequence can be used to estimate the speed of a car. For this, you need a section of straight road with a good view from a suitable distance away and physical features (evenly spaced fence posts) that can be used to measure distance.

Estimate the speed of the car in the pictures shown here using the following information:

- the original photographs were captured with a frame interval of 0.2 s;
- the fence posts on the far side of the road are spaced an average of 3.4 m apart.

Start by calculating an initial estimate of the car's speed using the single composite image, which shows the position of the car in the first and last pictures of the six-frame sequence. The blue bars indicate the total distance moved by the car; the orange bars indicate the distance between nine fence posts.

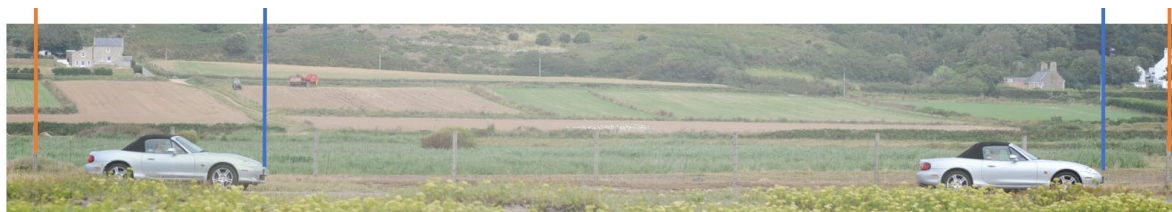


Image credits: Jon Tarrant, CC-BY-SA

For a more detailed analysis, determine the car's speed using the full sequence by plotting a graph of distance against time then calculating the gradient of the best-fit line.

Extension: identify and discuss the effects of any factors that will limit the accuracy of the value you have calculated.



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