

Distributing Objects Evenly on a Line

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1 Introduction

Our aim is to distribute identical objects on a line in a some sort of optimal manner. Let's say that the objects have width w_e , and they will fit in a region of width w_t . Call the number of objects n and their separation s . Then it follows that

$$n \cdot w_e + (n - 1) \cdot s = w_t, \quad \text{and} \quad n = \frac{w_t + s}{w_e + s}.$$

Now we need some limits on s to make our distribution pleasant. Let us say that the minimum acceptable s is kw_e , and the maximum is le_w , where k and l are some percentages; e.g., $k = 0.15$ and $l = 0.60$. Note that smaller values of s will lead to larger values of n , and vice versa. This means

$$n_{\min} = \left\lceil \frac{w_t + s_{\max}}{w_e + s_{\max}} \right\rceil \quad \text{and} \quad n_{\max} = \left\lfloor \frac{w_t + s_{\min}}{w_e + s_{\min}} \right\rfloor.$$

Hopefully, this gives you a nice range of n values, and you can choose one amongst those according to your taste. Once you make this choice

$$s = \frac{w_t - nw_e}{n - 1}.$$

Using this, you can set the centers of the objects you are distributing appropriately.