Text Justification

Justify a paragraph of words so that it looks aesthetically pleasing

$\hookrightarrow$ the spaces between words is as even as possible

Knuth: Badness of a line
(TeX)

l_i : length of the actual text in line i

L_i : textwidth of line i

$$\beta_i = \begin{cases} \infty & \text{if } l_i > L_i \\ (L_i - l_i)^3 & \text{o/w} \end{cases}$$

divide the paragraph into lines so that the total badness of the paragraph is minimized

$W(i) \leftarrow i^{th}$ word in the paragraph

$l(i) \leftarrow$ length of the ith word

Recurrence: for each k, find the badness when k words are in the first line

Justify (i)

badness of the
paragraph starting
from $w[i+1]$

$b(i,j)$ - badness of a line that starts
with word i and ends with
word j

$$b(i,j) = \begin{cases} \infty & \sum_{k=i}^{j-1}(\ell(k)+1) + \ell(j) > L \\ \left(L - \sum_{k=i}^{j-1}(\ell(k)+1) + \ell(j)\right)^3 & o/w \end{cases}$$

$$b(i,n) = \begin{cases} \infty & \text{if } \sum_{k=i}^{n-1}(\ell(k)+1) + \ell(n) > L \\ 0 & o/w \end{cases}$$

$$\text{Justify}(i) = \min_{i+1 \le k \le n} \left\{ b(i+1, k) + \text{Justify}(k) \right\}$$

Justify $(n) = 0$

Justify (0) = badness of the paragraph