Solution to Problem Magnetic Stones

1 Key Ideas for Solution

The problem can be solved by dynamic programming on folding the substrings of length L, where $1 \leq L \leq n$ and n is the length of the original string. Let $S[i, j]$ be the optimal released energy of folding substring $S[i, j]$. $S[i, j]$ can be computed by picking the maximum of

1. $S[i + 1, j - 1] + 2$ or -1, depending on whether $S[i]$ attracts or repels $S[j]$, respectively.
2. $S[i + 1, j] - 1$.
3. $S[i, j - 1] - 1$.
4. $\max_{i<k<j}\{S[i, k] + S[k + 1, j]\}$. This recusion is for computing optimal energy of two or more folding hairpins.

The optimal solution is thus $S[1, n]$.