

$$\begin{aligned}
\sum_{i=1}^{N-1} \sum_{j=0}^{i-1} (A_i - A_j)^2 &= \sum_{i=1}^{N-1} \sum_{j=0}^{i-1} (A_i^2 - 2A_i A_j + A_j^2) \\
&= \sum_{i=1}^{N-1} (i * A_i^2 - 2A_i \sum_{j=0}^{i-1} A_j + \sum_{j=0}^{i-1} A_j^2)
\end{aligned}$$

$$dp_{i-1} = dp_i + \frac{n}{i-1}$$