This is a variant of the 1D facility location problem (uniform k-median, continuous version).
1. DP. $O(n^2k)$.
2. $O(nk)$ [1].
3. $O(\min\{nk, n\sqrt{k\log n}\log n, n2^{O(\sqrt{\log k \log\log n})}\log n\})$ [2].

References

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