Find the maximum sum of products of two arrays.

Posted on January 27, 2019 | by Prashant Yadav

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An algorithm to find the maximum sum of products of two arrays.

We will implement a simple algorithm in javascript to find the maximum sum of products of given two arrays. Both the arrays will be of the same length.

Example

```
Input:
[1, 2, 3]
[5, 4, 3]

[4, 7, 5, 2]
[2, 3, 2 ,1]

Output:
26 = 5 * 3 + 4 * 2 + 3 * 1
41 = 7 * 3 + 5 * 2 + 4 * 2 + 2 * 1
```

Implementation

- We will first sort both the arrays in any order.
- Then we will find the product of the each elements and add them.
- Everything will be written in ES6.

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```
let productSum = (arr1, arr2) => {
  //sort the arrays in ascending order
  arr1.sort();
  arr2.sort();

  let sum = 0;

  //calculate the sum of the products
  for(let i = 0; i < arr1.length; i++){
    sum += arr1[i] * arr2[i];
  }

  return sum;
}
```

```
Input:
console.log(productSum([1, 2, 3], [5, 4, 3]));
console.log(productSum([4, 7, 5, 2], [2, 3, 2 ,1]));

Output:
26
41
```

Time complexity: O(nlogn);

Space complexity: O(1);

Time and Space complexity

- We are sorting both the arrays which will take O(nlogn) then we are calculating the sum of the products of each element which will take O(n), so Time complexity is O(nlogn).
- We are using constant space, so Space complexity is O(n).

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Why sort?

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April 29, 2019 At 9:46 Am

We sort the arrays so that we should be able to multiply bigger numbers together and then add them to get the maximum sum.

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