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# Sorting in JavaScript

## Under the hood

Manish Poduval

# What is this all about?

Once I went down a rabbit hole myself trying to really understand this meme

```
// How do they sort emojis ?
const meme = ["🥚","🐓", "🐤", "🐣"];

meme.sort()
// ['🐓', '🐣', '🐤', '🥚']
```

Why ? How ?

And hence this explanation on how sort actually works

Deeper stuff ahead

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# Some basics . . .

The sort() method in JavaScript is primarily used for sorting elements in an array.

## Two ways to use it

Without a compare function

```
// Functionless
sort()

// Compare Function
sort(compareFn)
```

With a compare function

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# 1. Functionless Sort

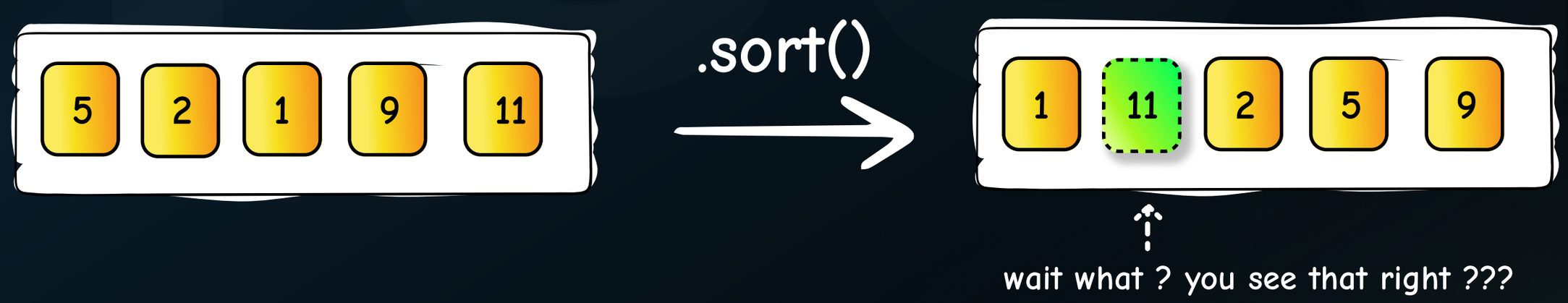
Let's look at a simple functionless sort and see how it works

```
// Your sample array
const numbers = [5, 2, 1, 9, 11];

numbers.sort()

console.log(numbers)
//  [1, 11, 2, 5, 9];
```

Visualizing it, this is what happens



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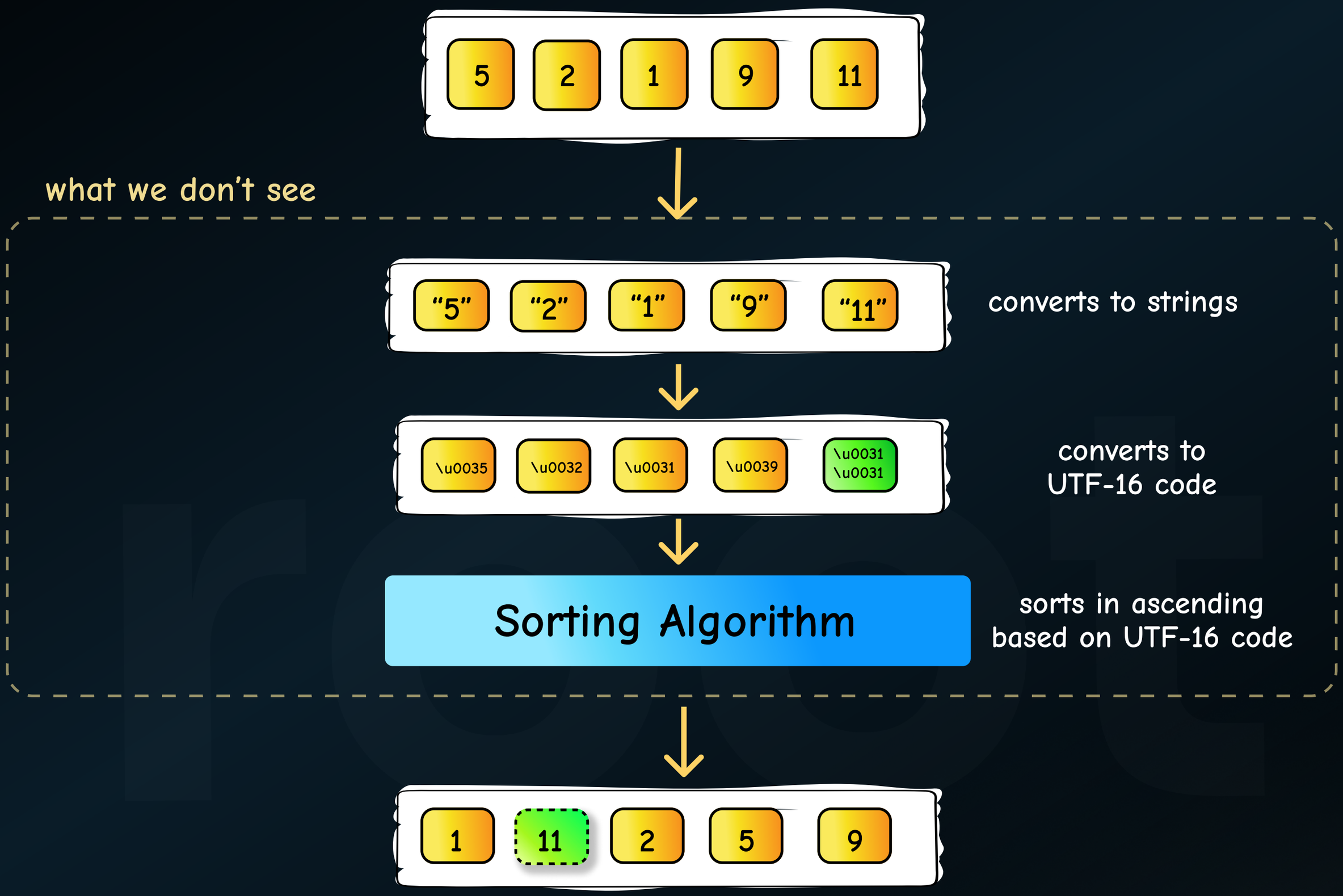
# A highlevel sort() flow . . .




The sorting happens "in-place" i.e it modifies the original array

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# 2. With a Compare Function

```
// Your sample array
const numbers = [5, 2, 1, 9, 11];

numbers.sort(function(a, b){
    if (a > b) {
        return 1;
    }
    else if (a < b) {
        return -1;
    }
    else {
        return 0;
    }
});

console.log(numbers);
//  [1, 2, 5, 9, 11];
```

Our compare function

There are shorter alternatives to this, but they mainly work only with numbers

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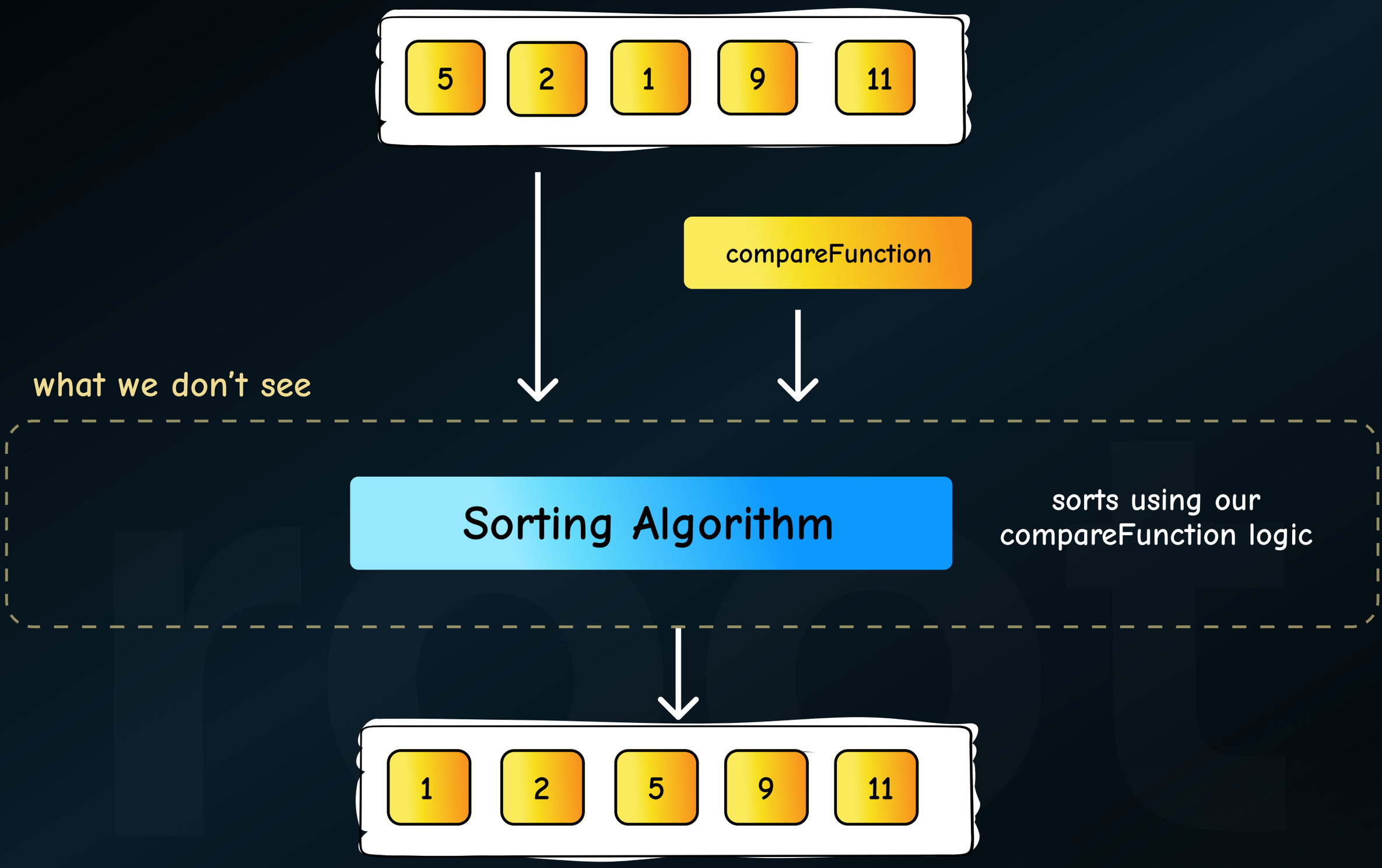
# visualizing that flow . . .




The sorting happens "in-place" i.e it modifies the original array

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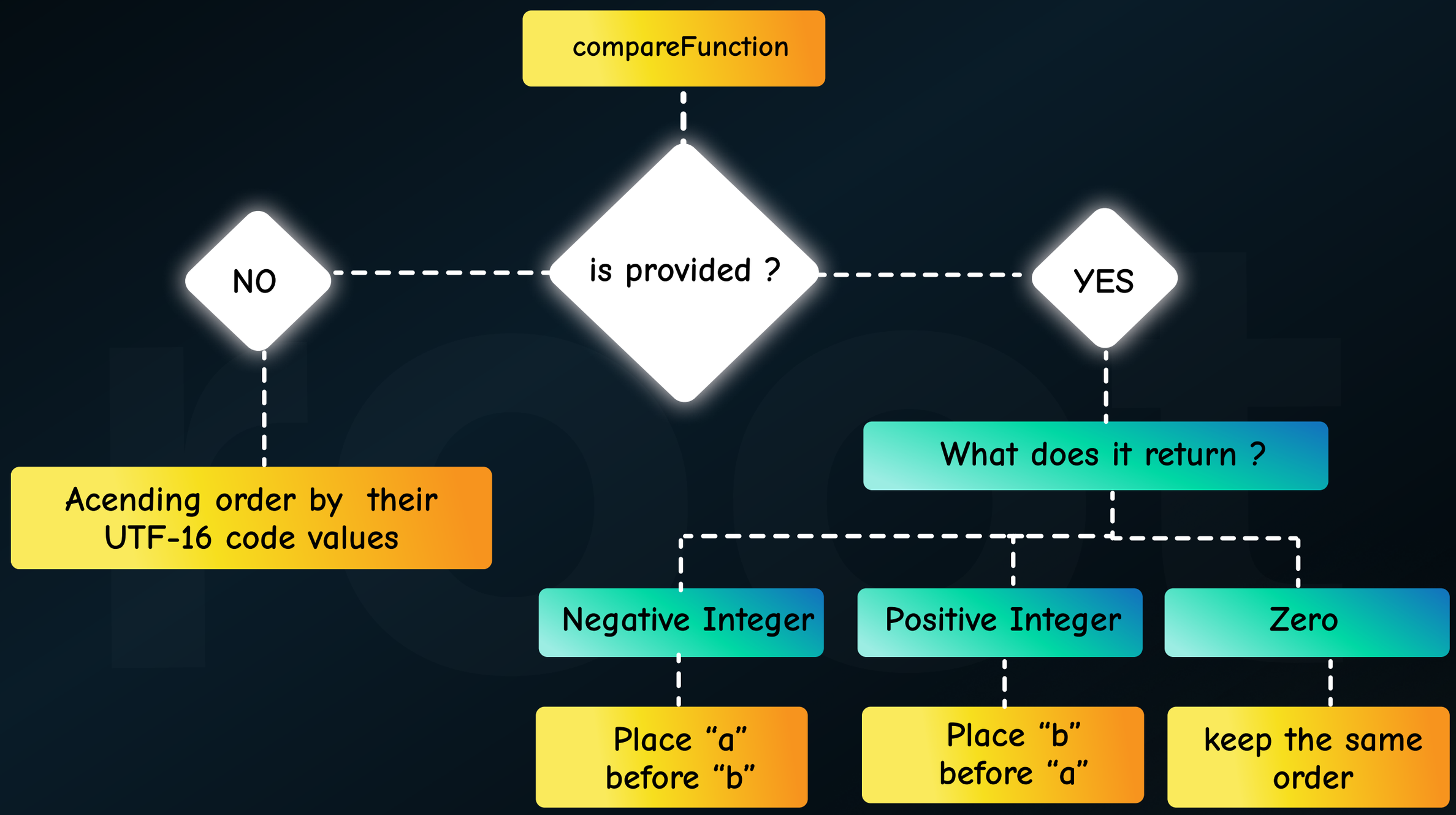
# What about the compare function?

Now the pure purpose of the compare function is just to let the algorithm know how to sort them (Ascending or Decending)

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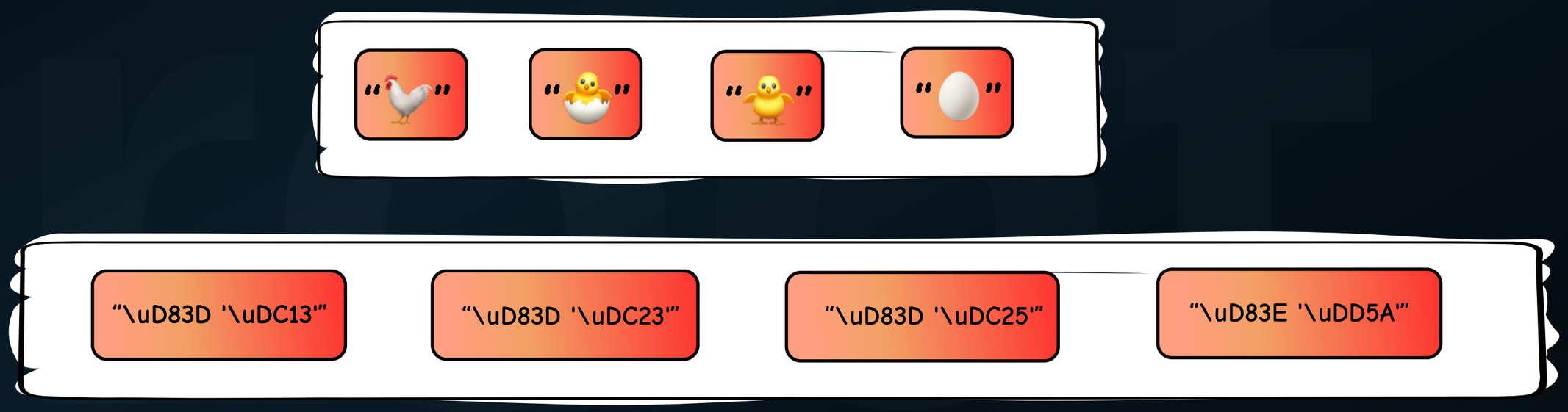
# So now we understand the emojis

They're just sorted in ascending based on the UTF-16 values

```
// How do they sort emojis ?
const meme = ["🥚","🐓", "🐤", "🐣"];

meme.sort()
// ['🐓', '🐣', '🐤', '🥚']
```




But still, how is that sorting actually hapenning ?

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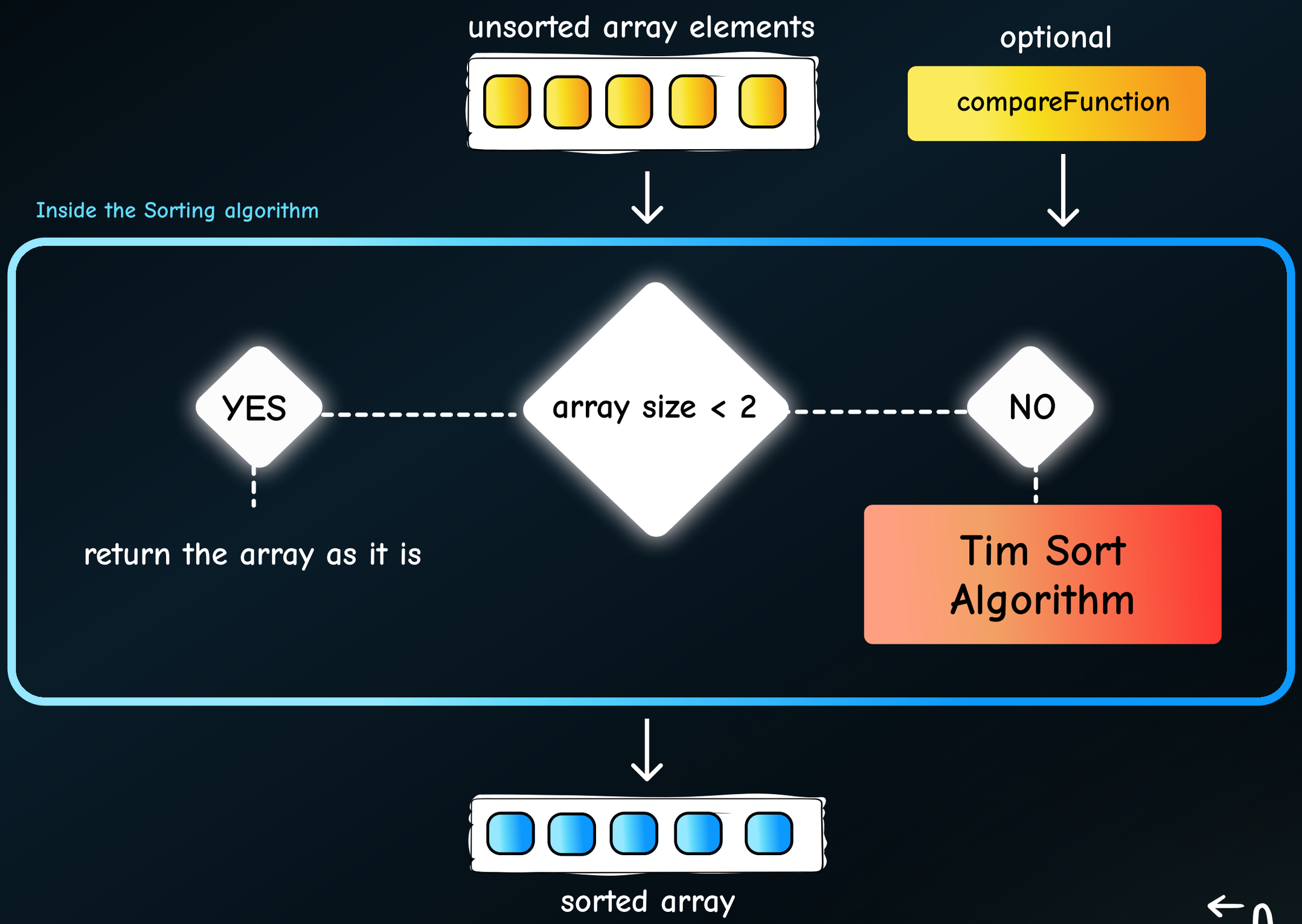
# What is that sort algorithm ?

Our JS engine relies on a very popular sorting algorithm internally

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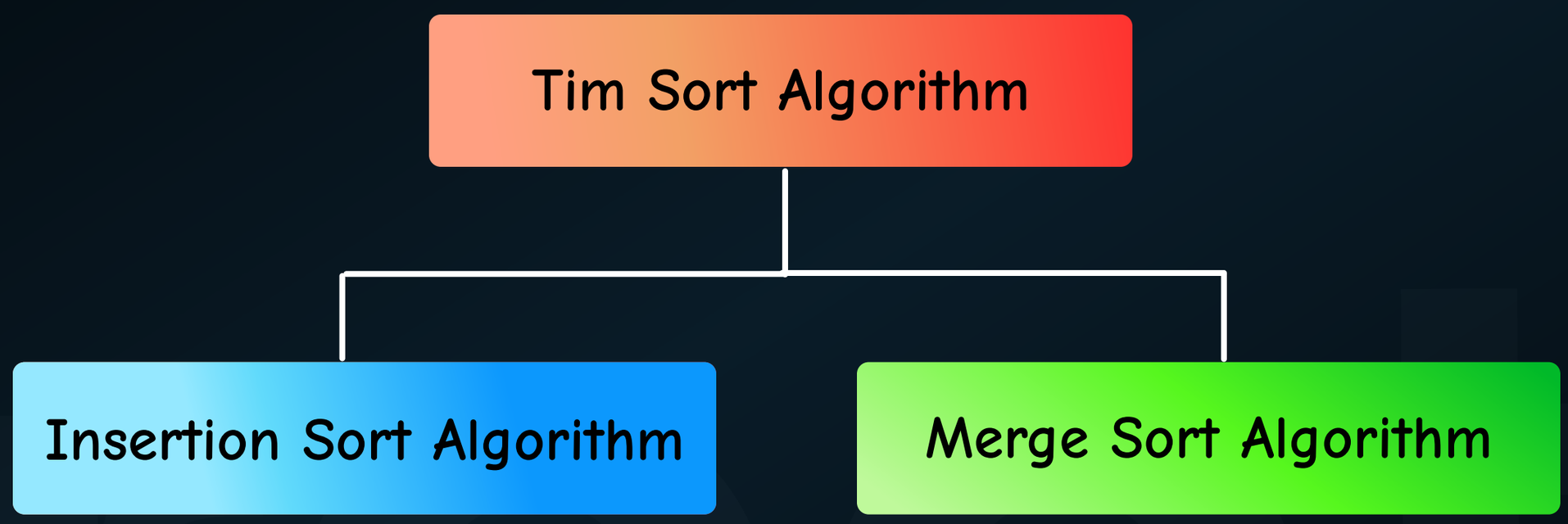
# What is this TimSort thingy . . ?

It's a hybrid sorting algorithm which uses a combination of two other well know sorting algorithms




Binary Insertion Sort to be precise, nerds!

More Deeper stuff ahead

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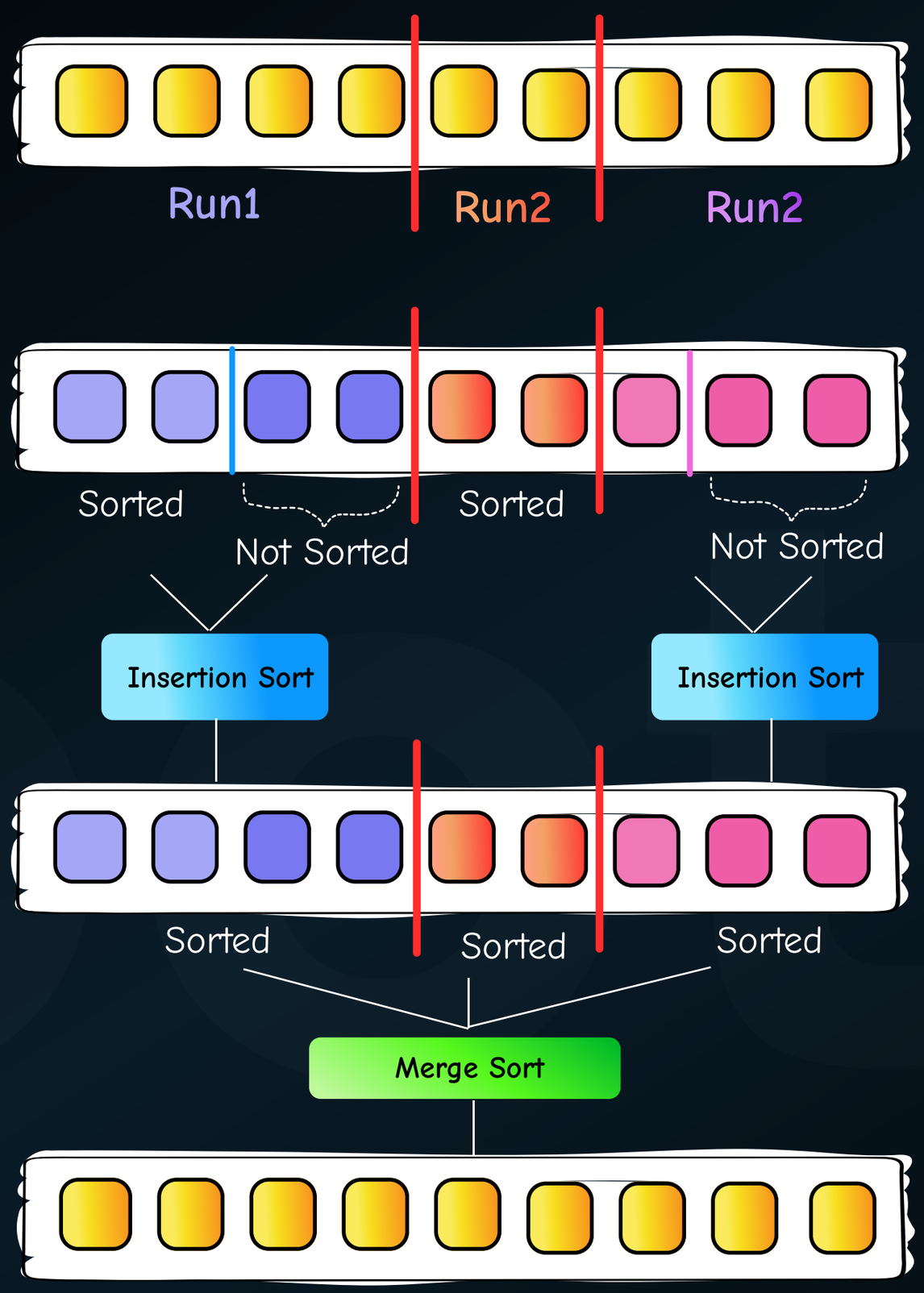
# Let's take a look at how it works

## Tim Sort Algorithm high level overview




Break the array down into small "runs" - small subsets in the array

Find "minRun" and check which elements are sorted and which aren't

Use Insertion sort to sort these smaller "runs"

Use Merge sort to sort these larger sorted "runs"

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# That's a wrap

That's a very high level overview of what's going on with that sort() method

Understanding these sorting algorithms is some beauty in itself. Look it up online

I hope you've learn't something new today

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