

SORTING ALGORITHMS

RADIX SORT



Radix sort

- ▶ Can be very efficient, because there are no comparisons
- ▶ So $O(N)$ running time can be reached
- ▶ Running time: $O(k*N)$ where k is the number of digits in the input number
- ▶ We sort the elements according to individual characters
- ▶ It is a stable sorting algorithm

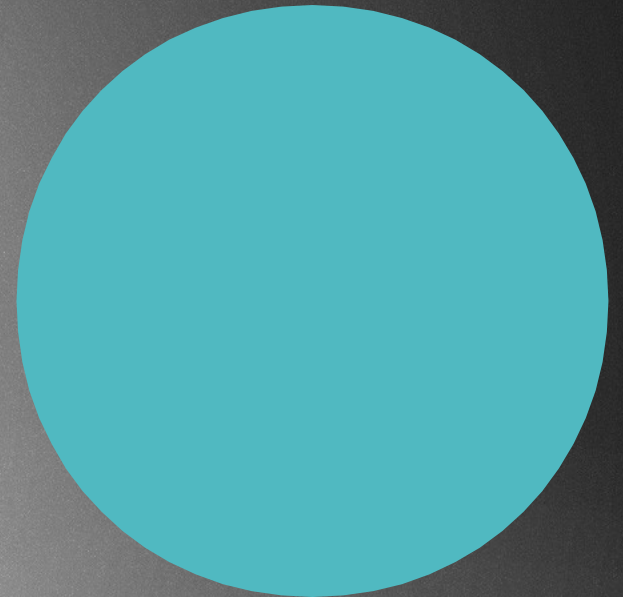


LSD string sorting

- ▶ Least-significant-digit-first string sorting
- ▶ Consider characters from right to left
- ▶ We can use it to fixed length strings or fixed length numbers for example integers
- ▶ Sort the characters at the last column ... then keep going left and sort the columns independently
- ▶ Typical interview question: how to sort one million 32-bit integers

MSD string sort

- ▶ Most-significant-digit-first string sorting
- ▶ Consider characters from left to right
- ▶ It is sensitive to **ASCII** and **Unicode** representations
- ▶ It has several advantages
 - ▶ **MSD** examines just enough characters to sort the key
 - ▶ **CAN BE SUBLINEAR IN INPUT SIZE !!!**
- ▶ **MSD** access memory randomly ... not so efficient
- ▶ Solution: we should combine it with quicksort ... this is the 3-way radix quicksort



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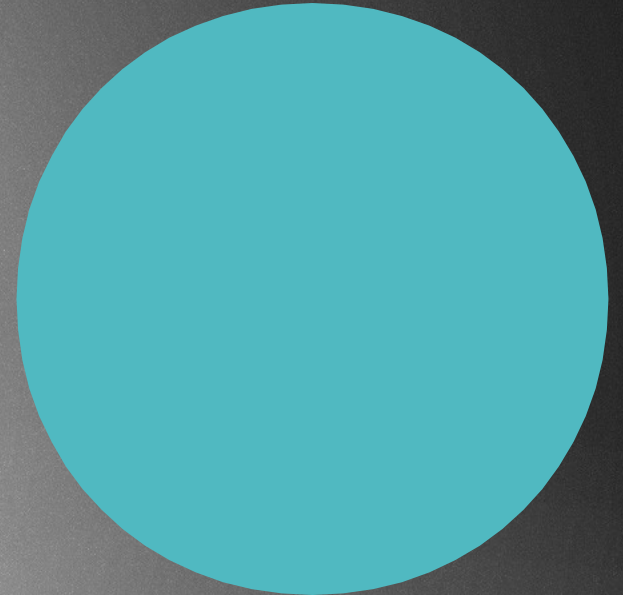
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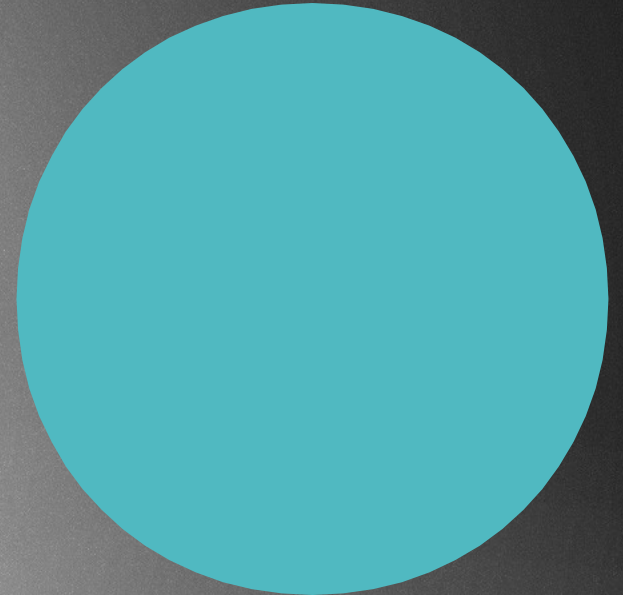
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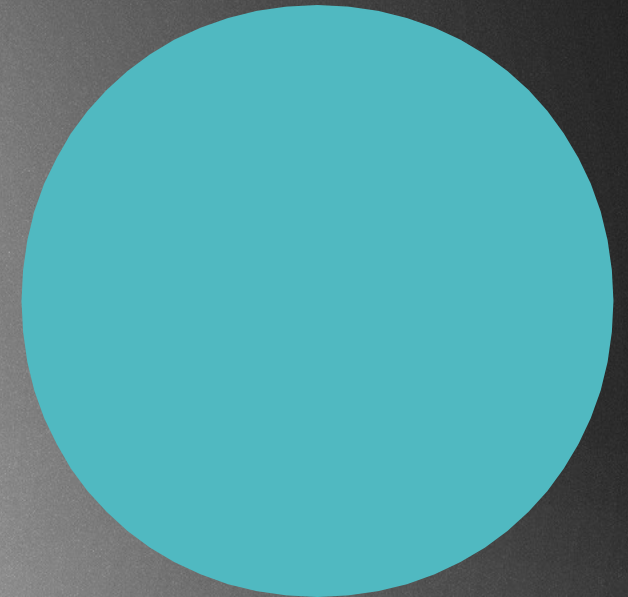
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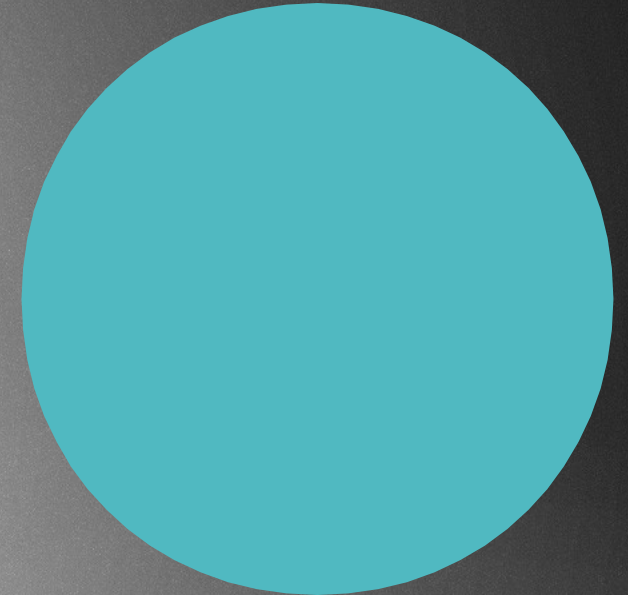
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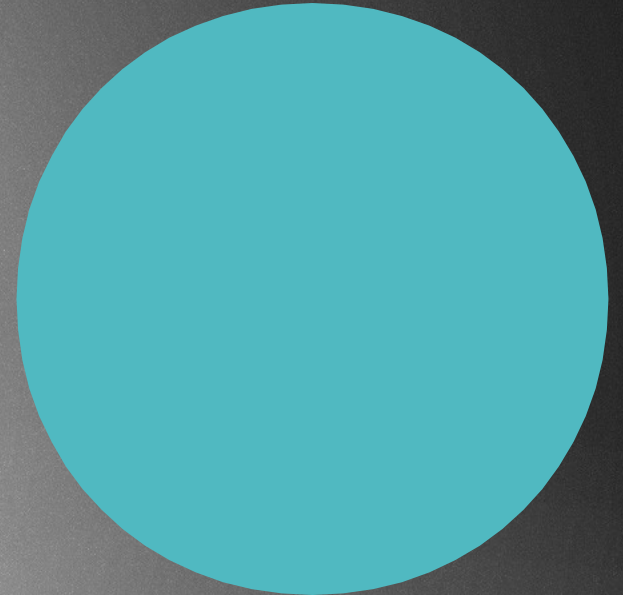
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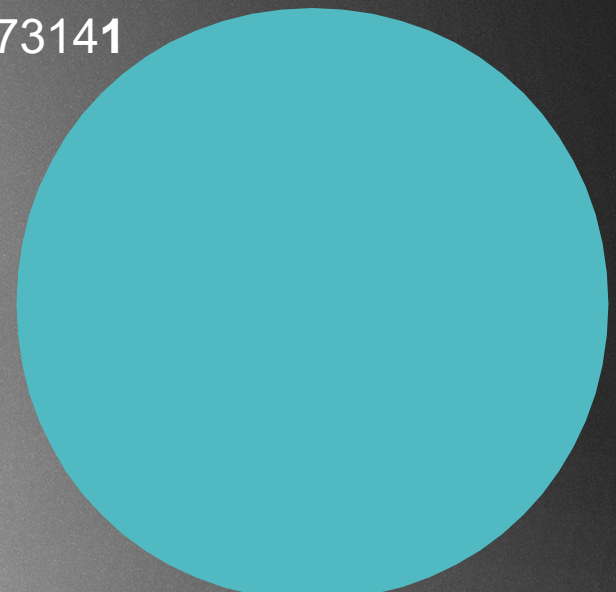
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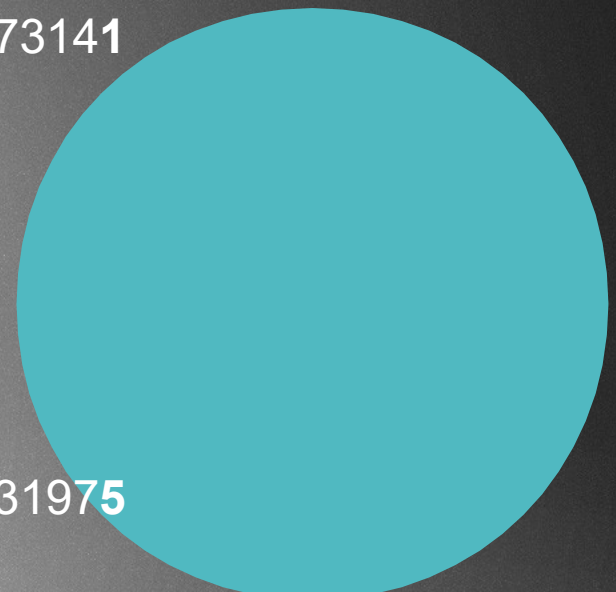
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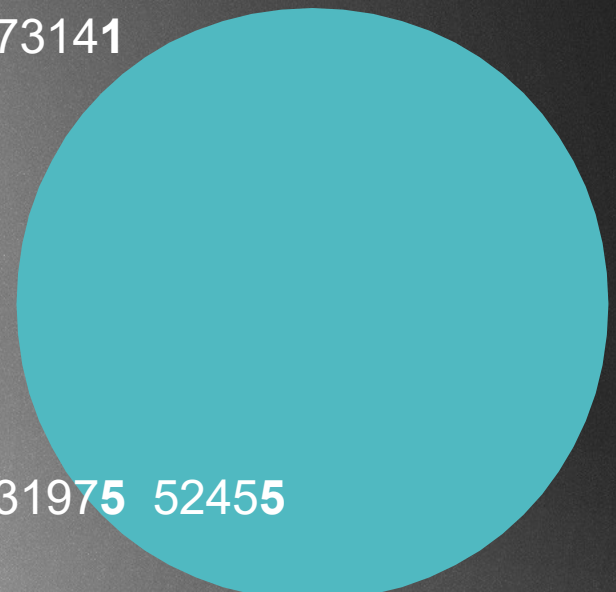
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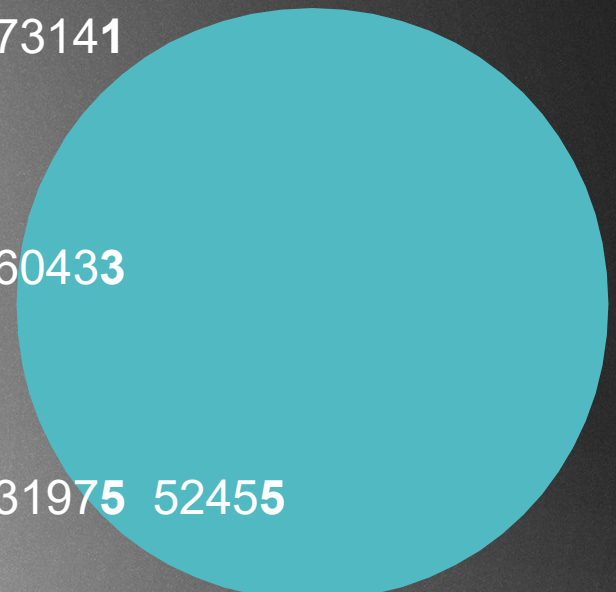
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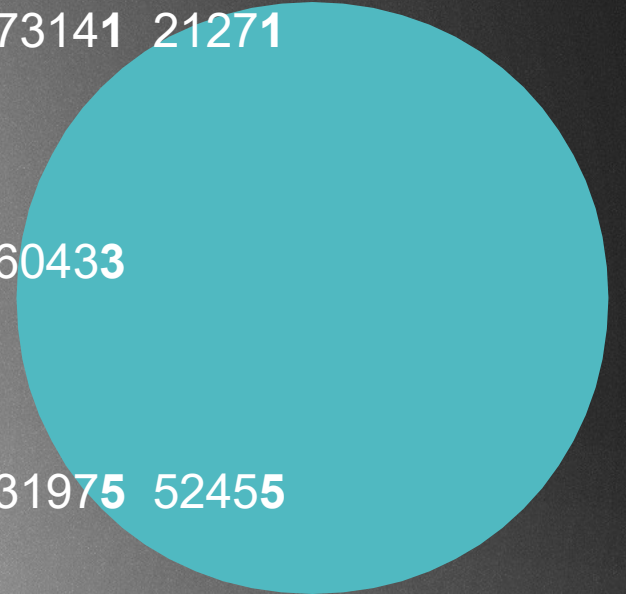
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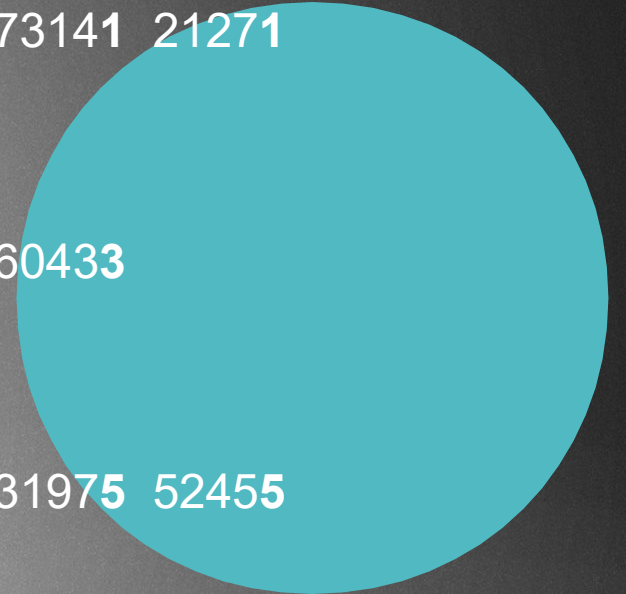
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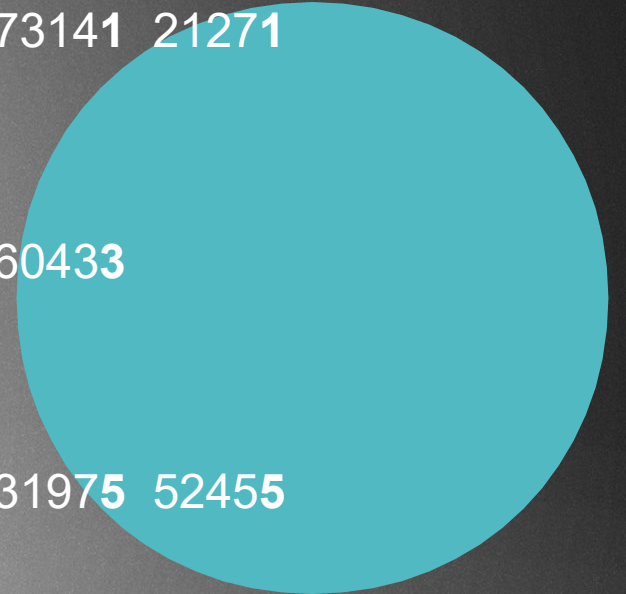
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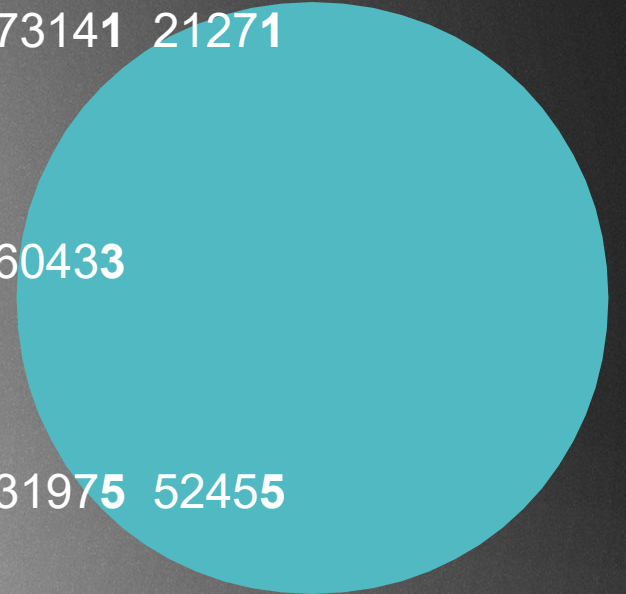
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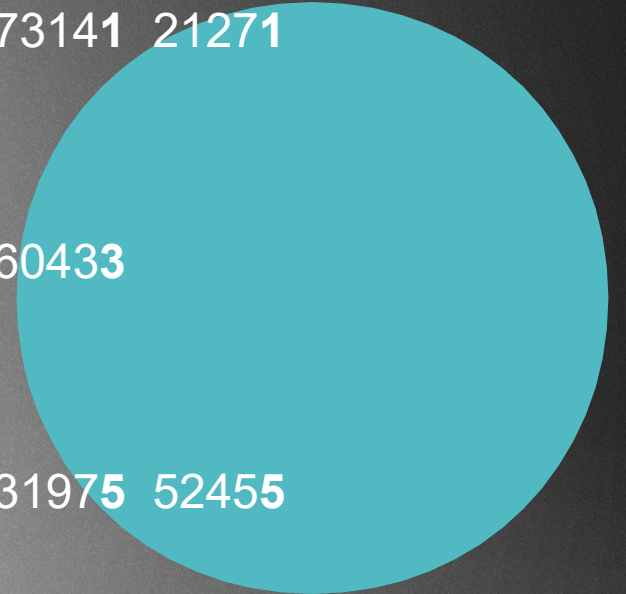
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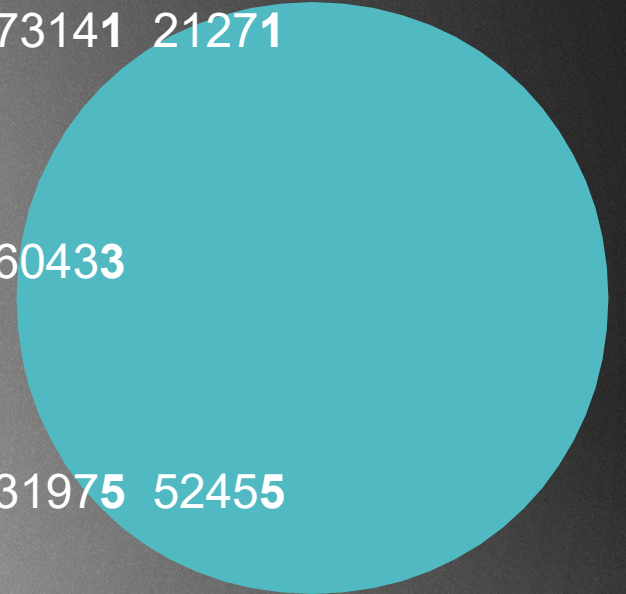
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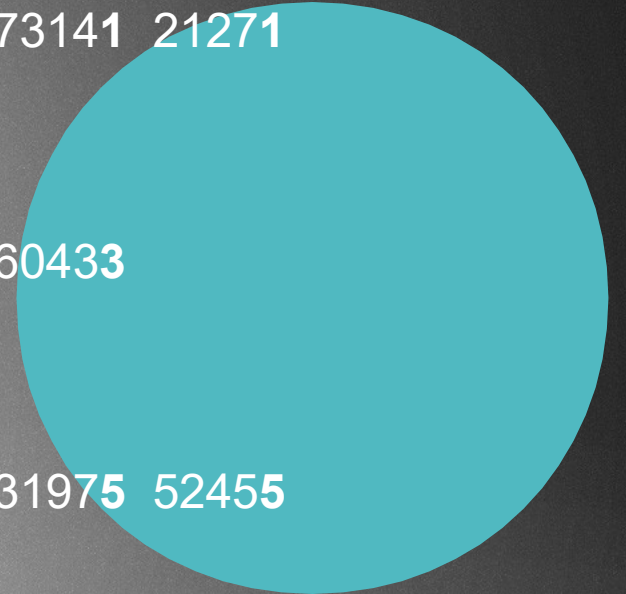
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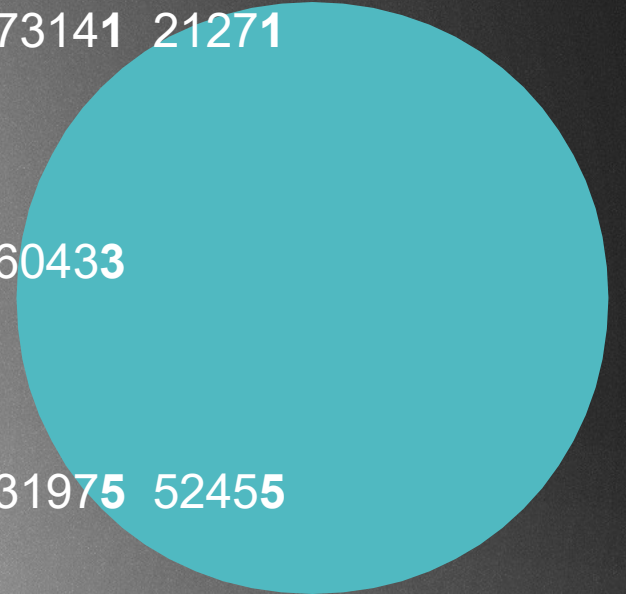
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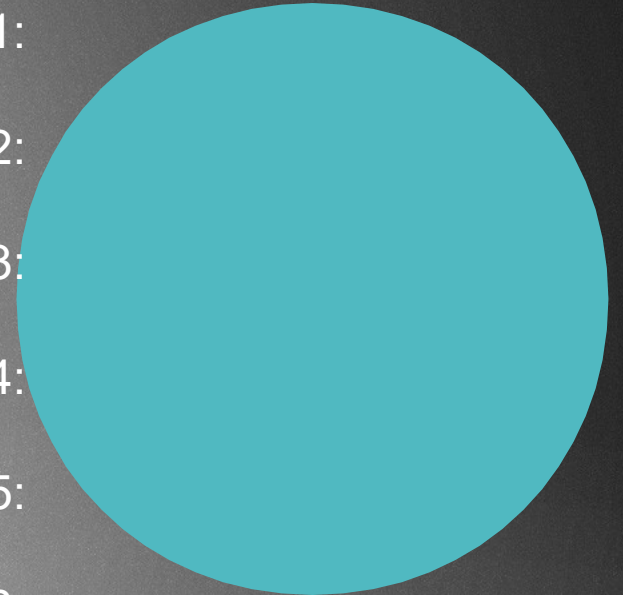
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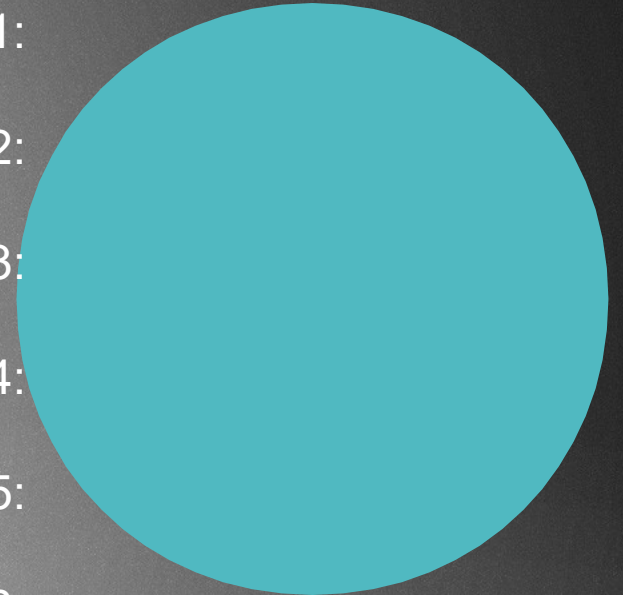
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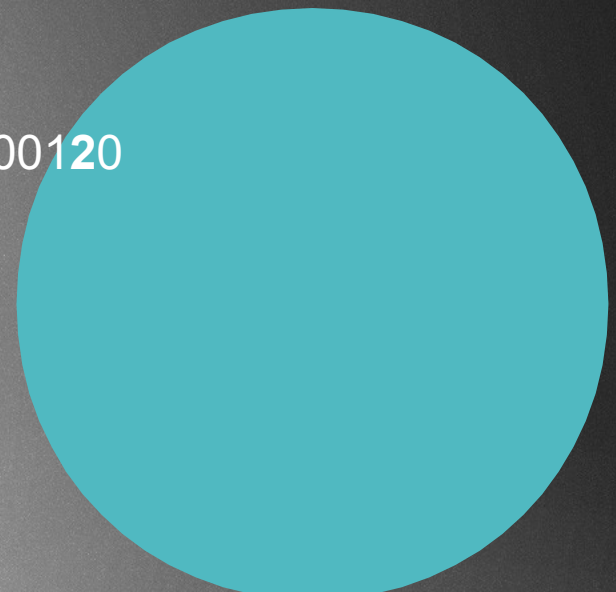
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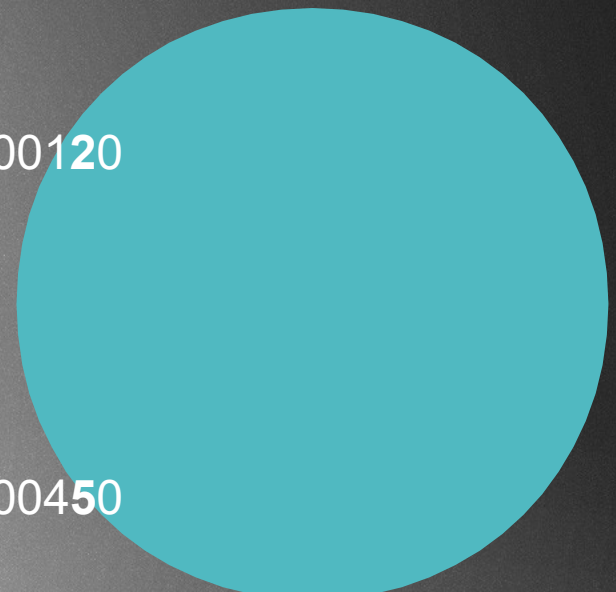
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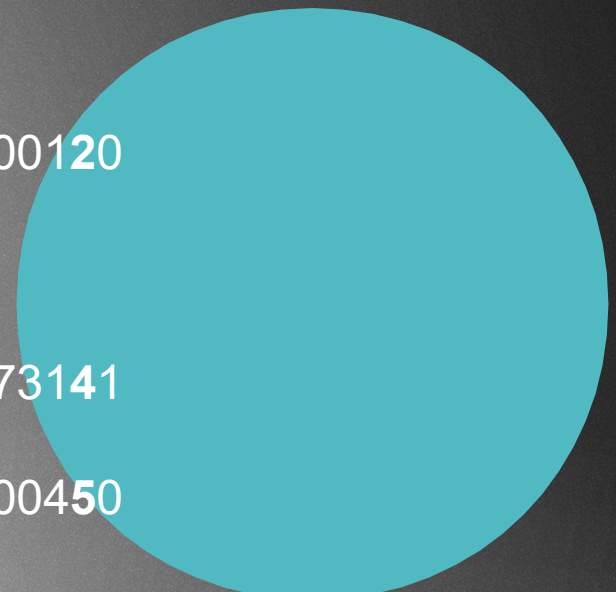
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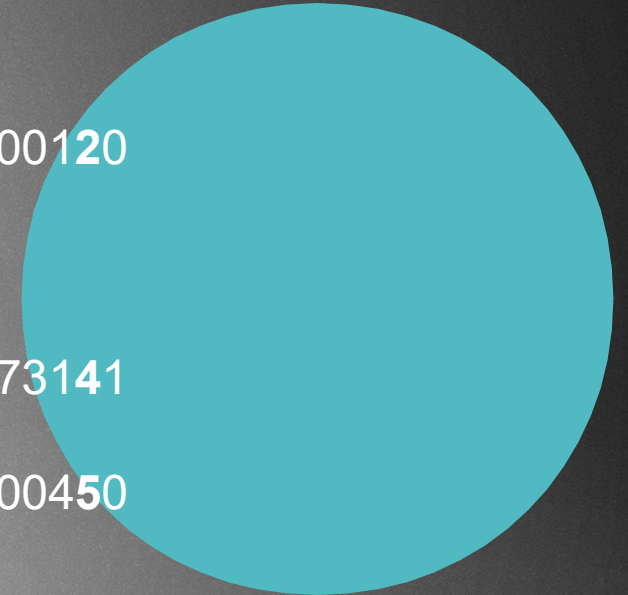
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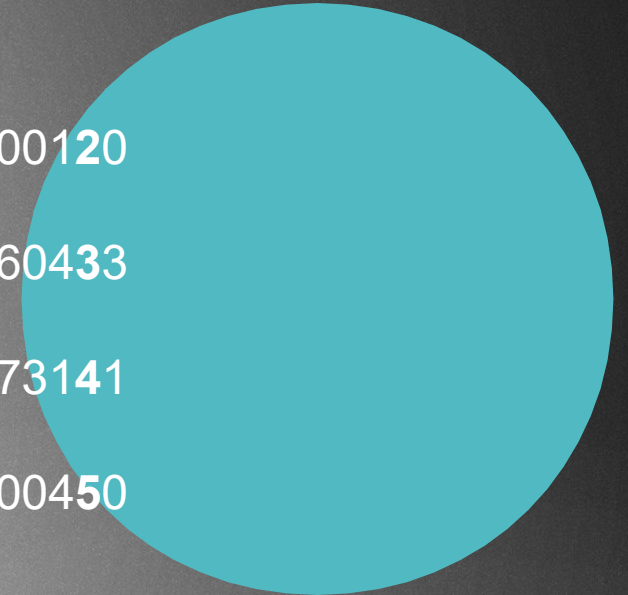
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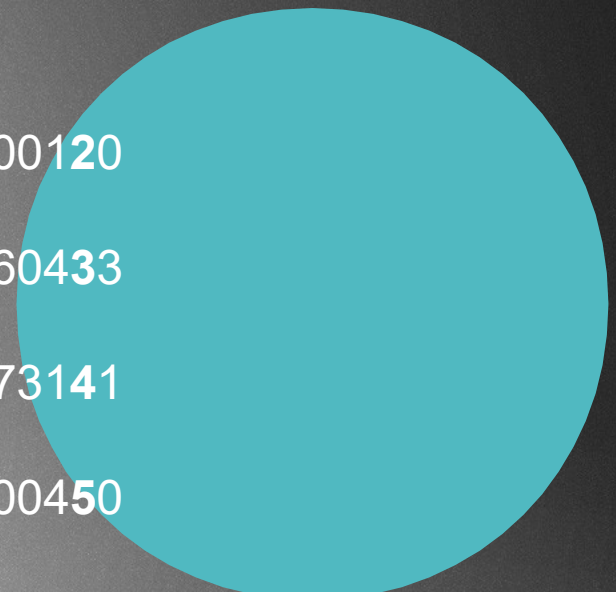
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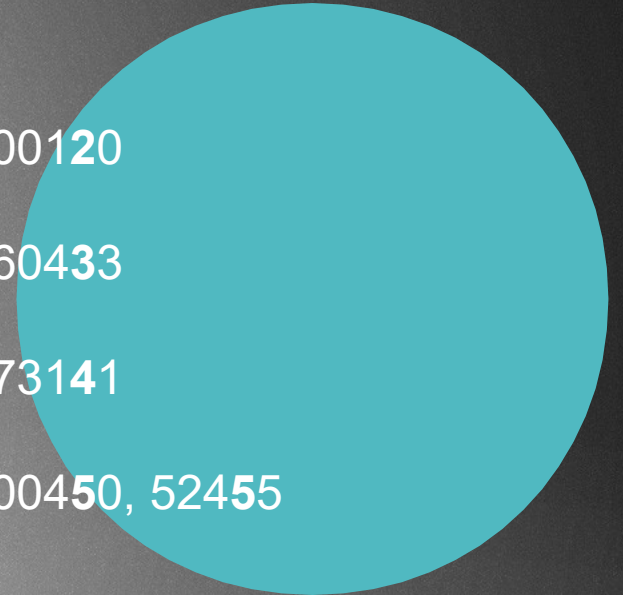
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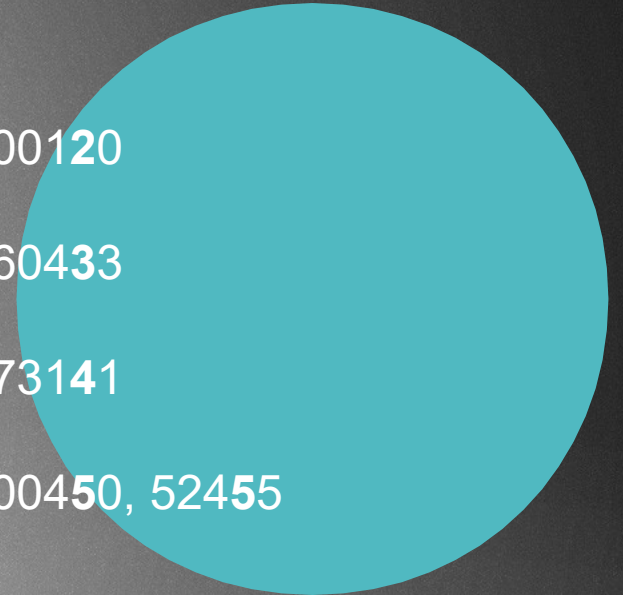
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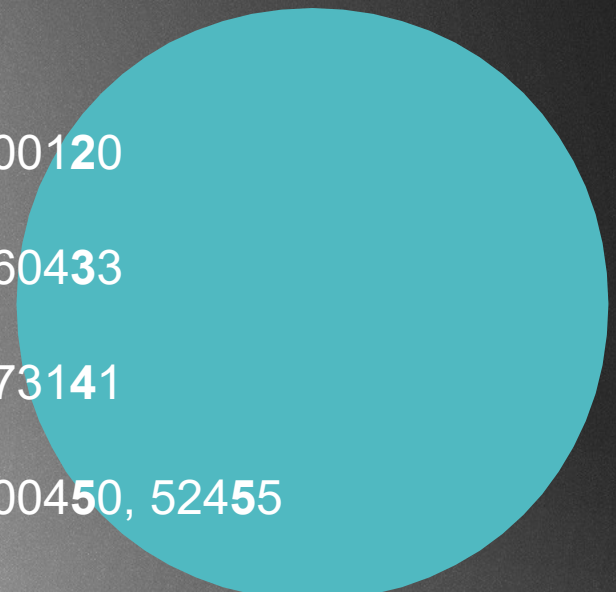
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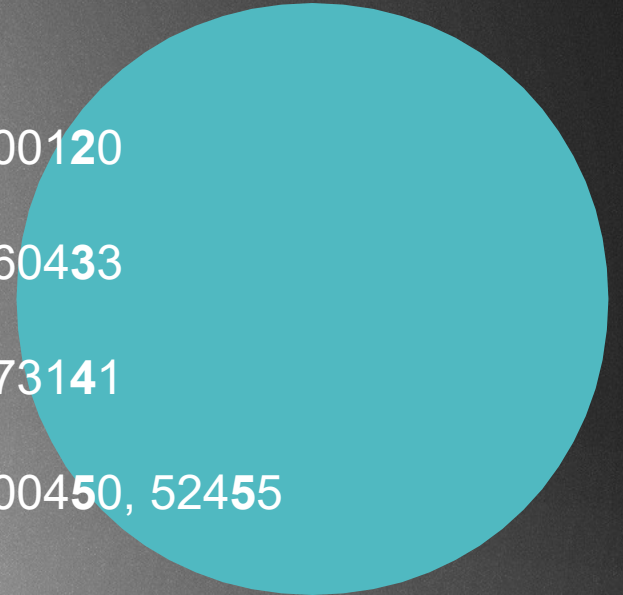
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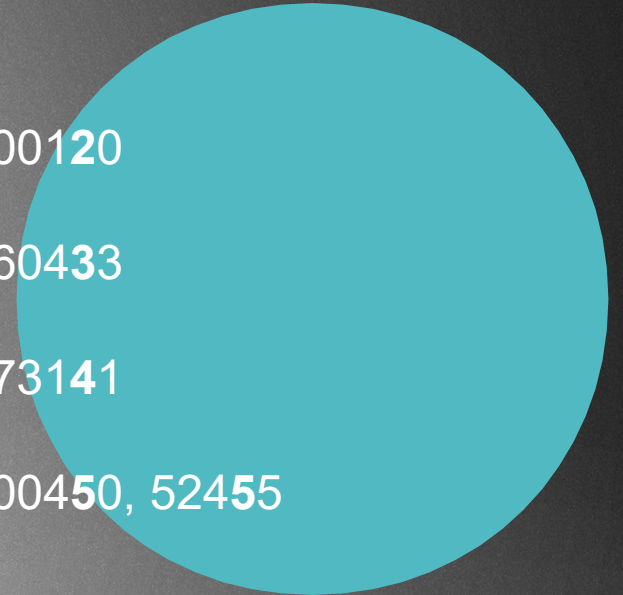
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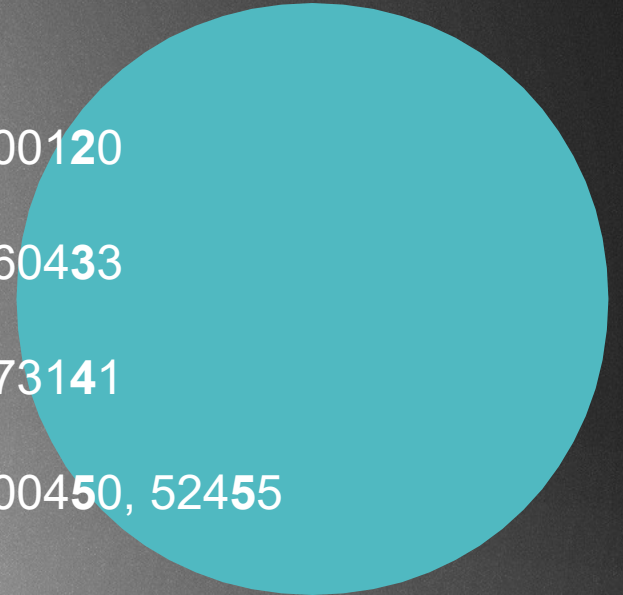
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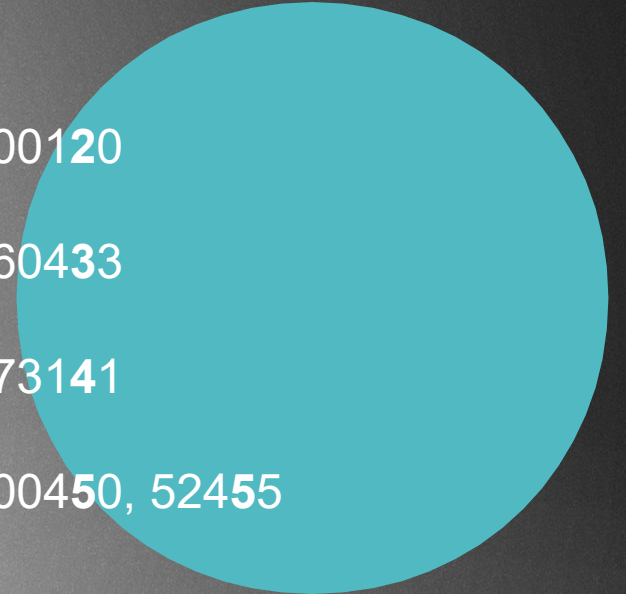
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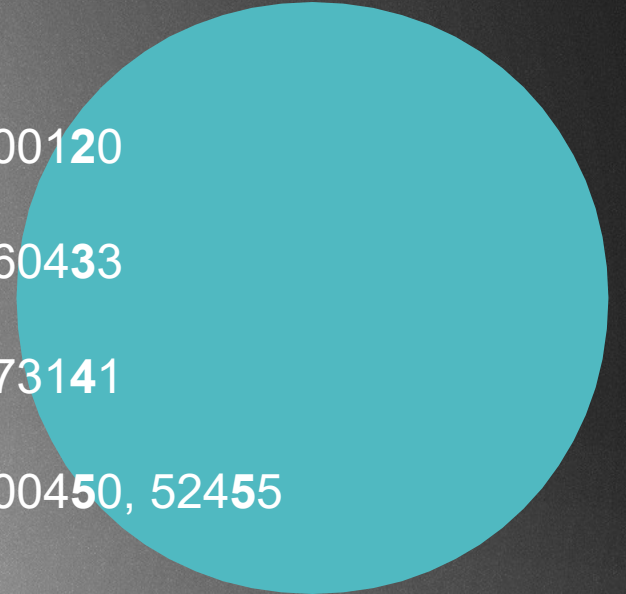
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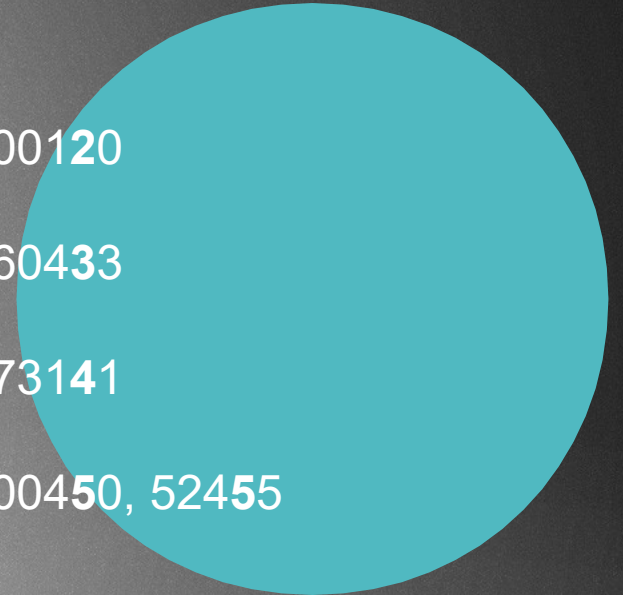
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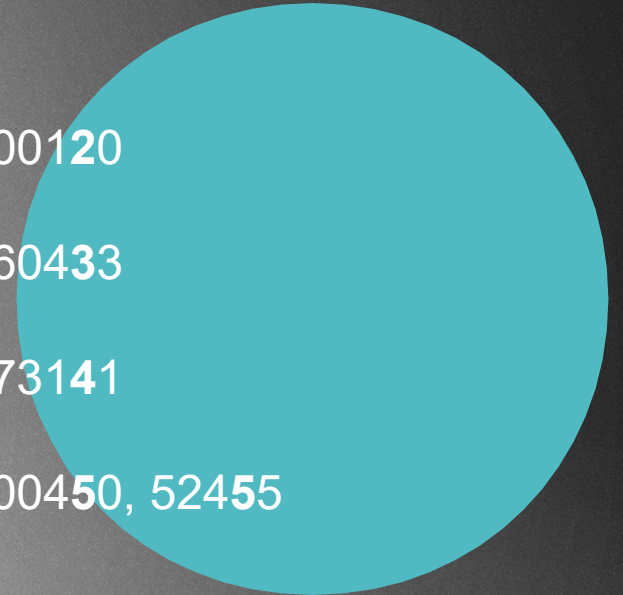
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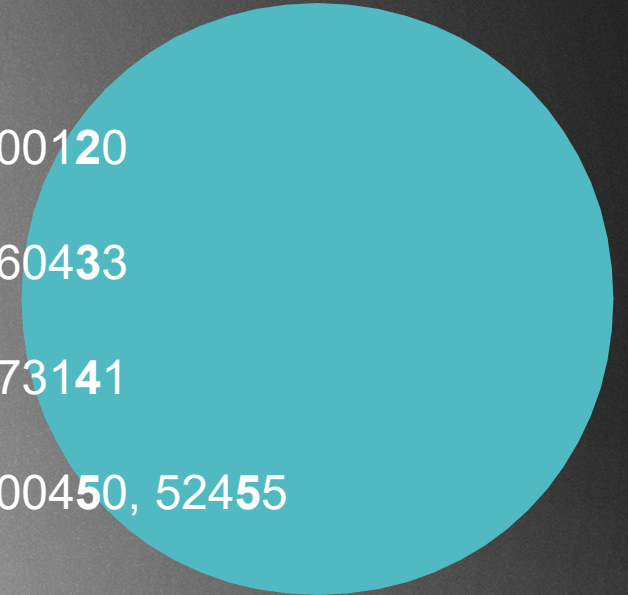
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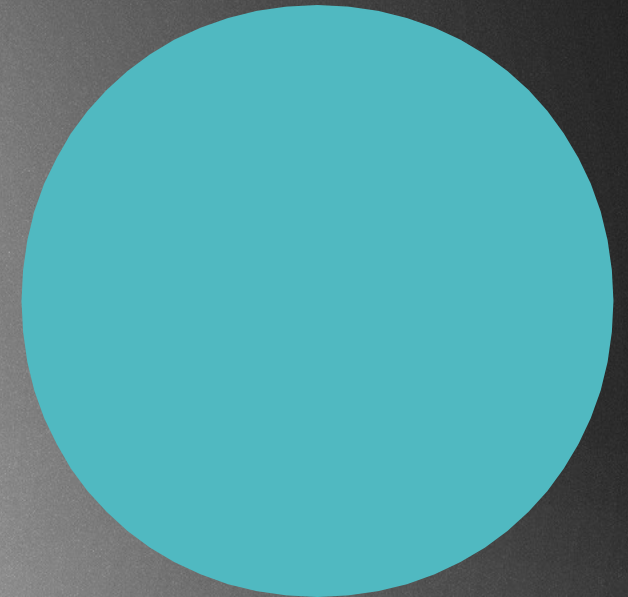
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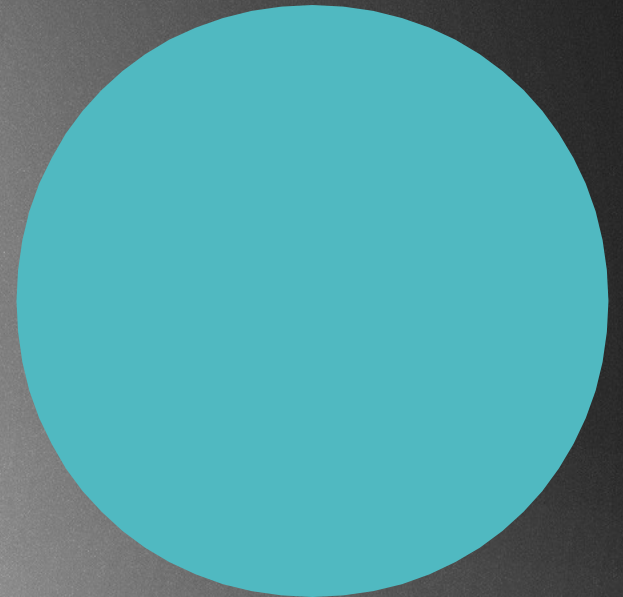
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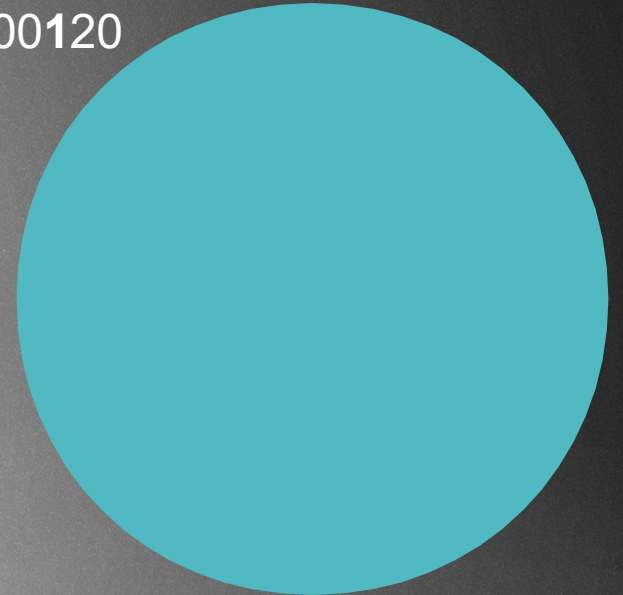
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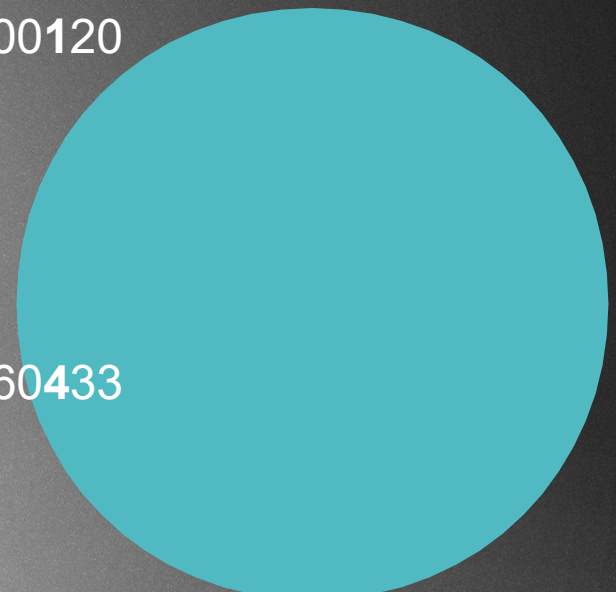
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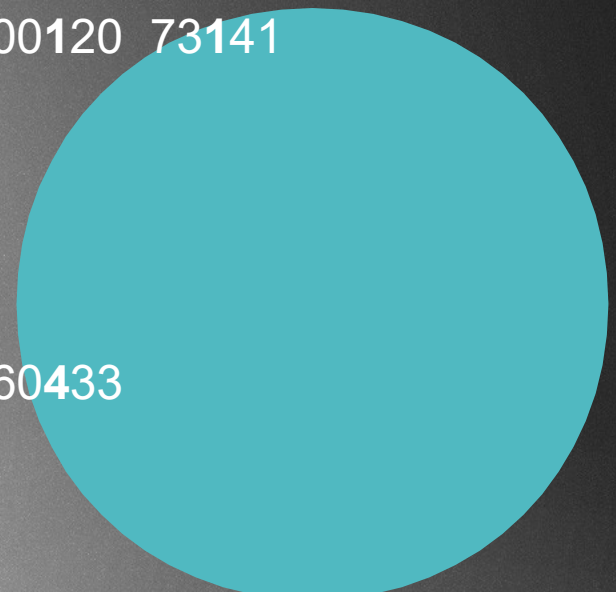
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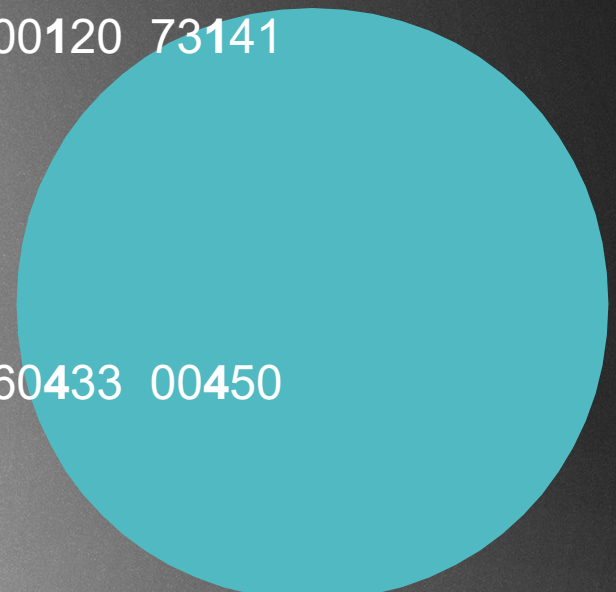
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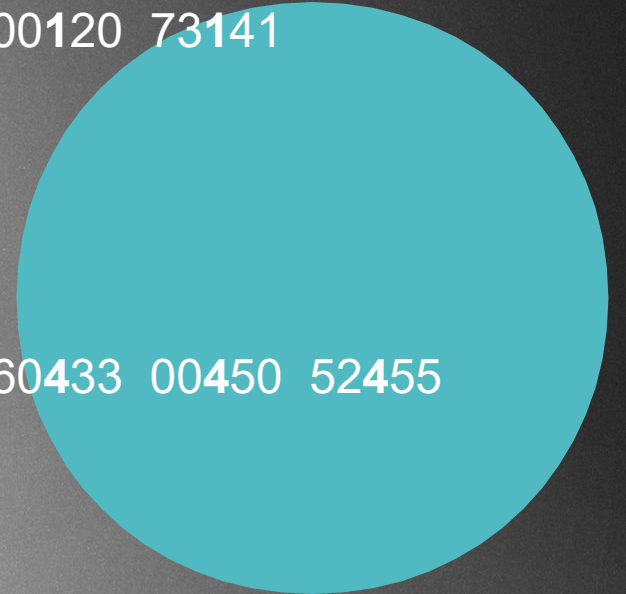
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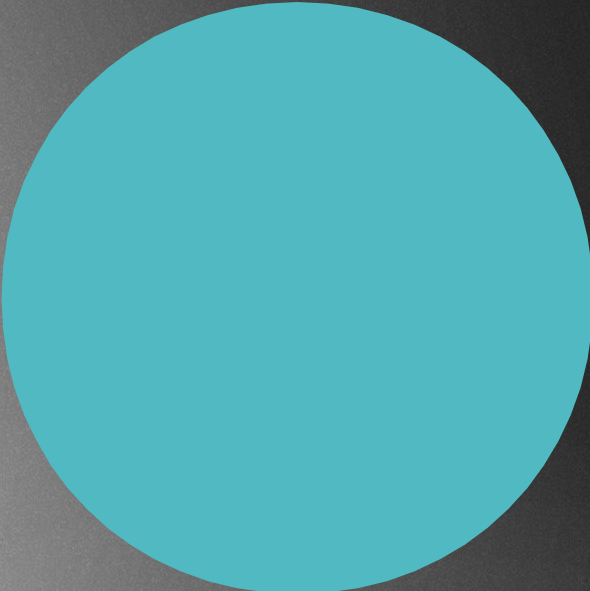
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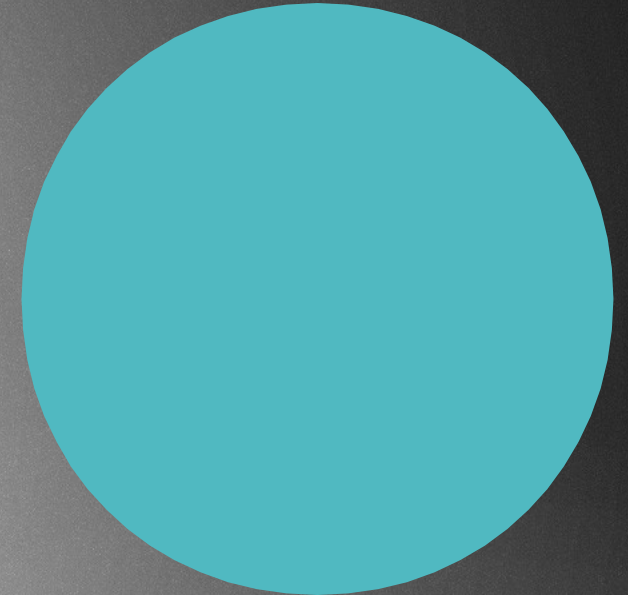
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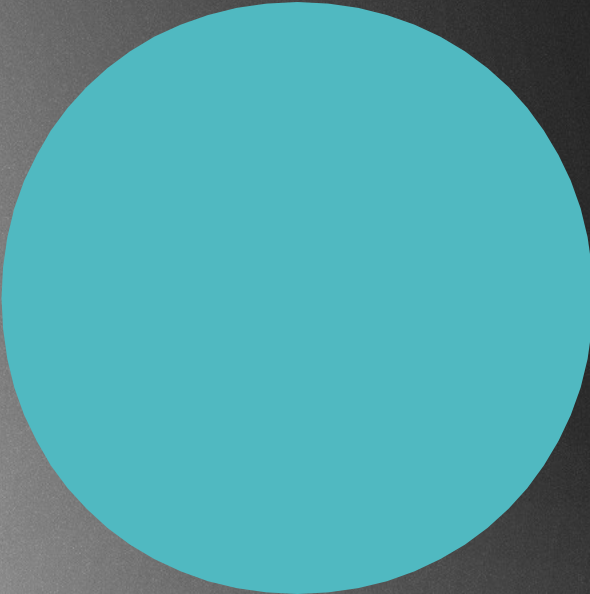
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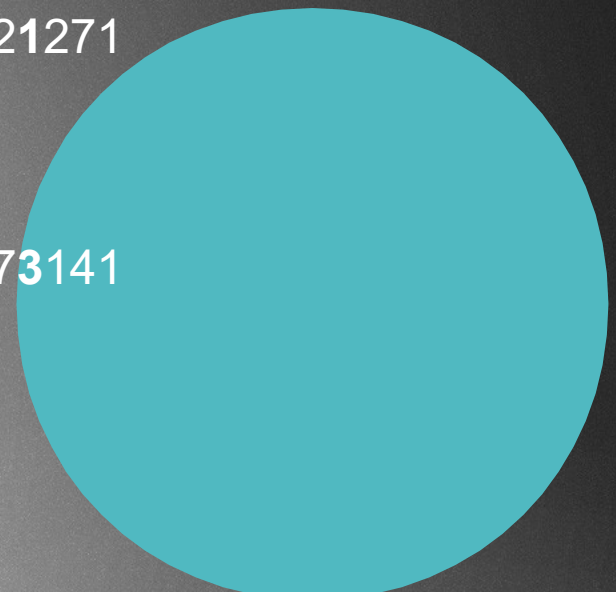
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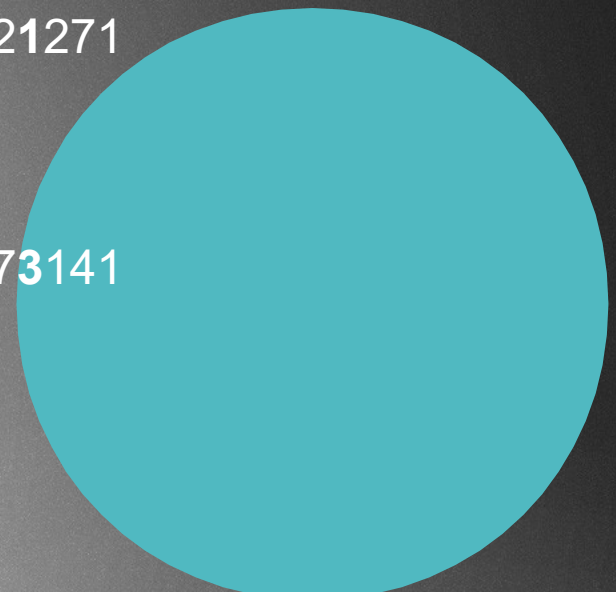
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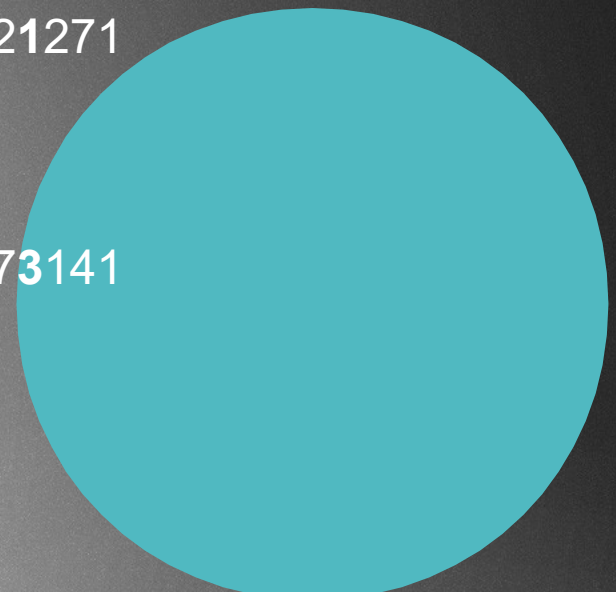
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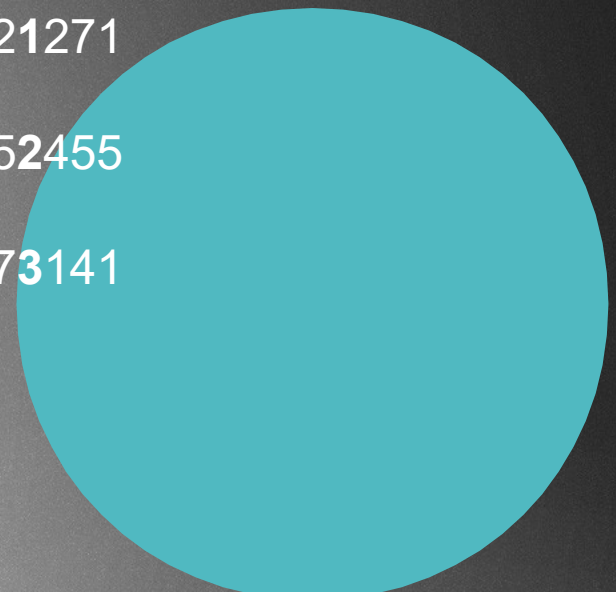
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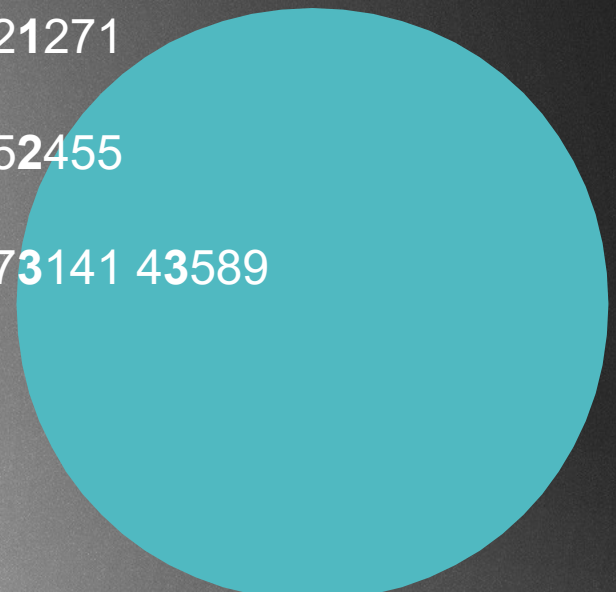
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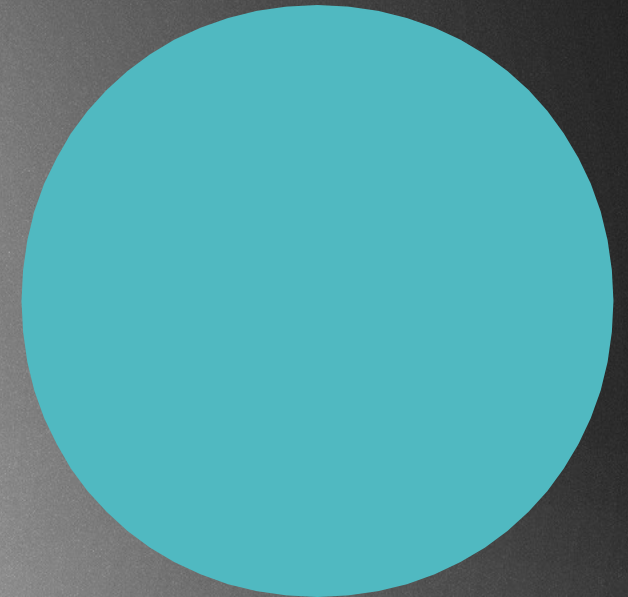
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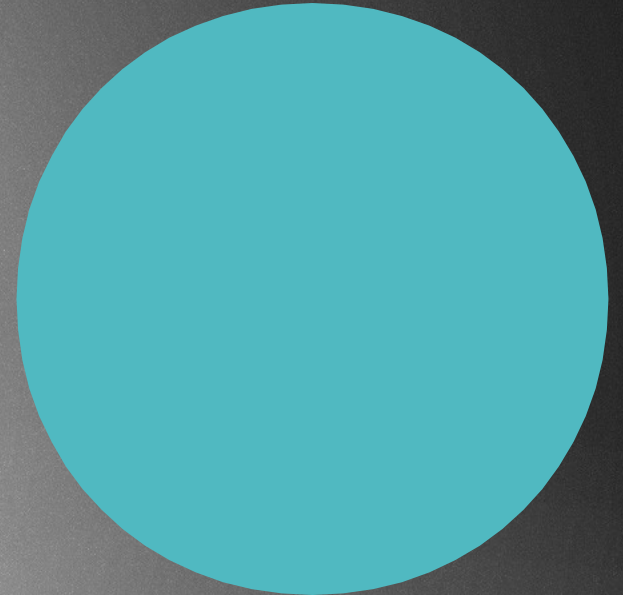
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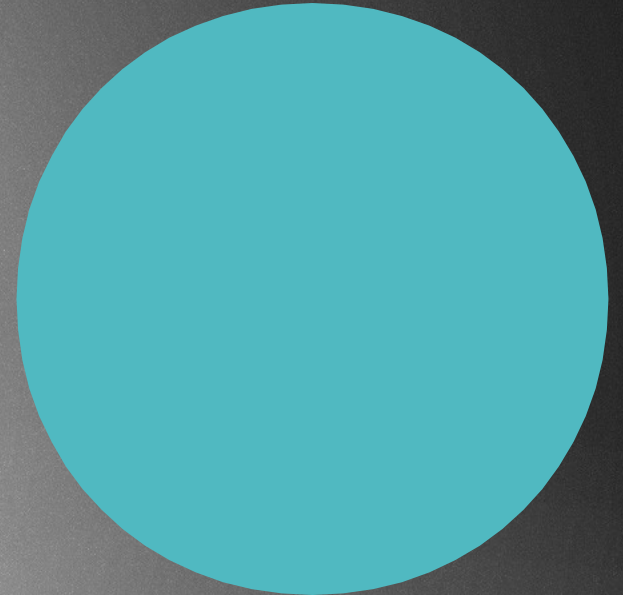
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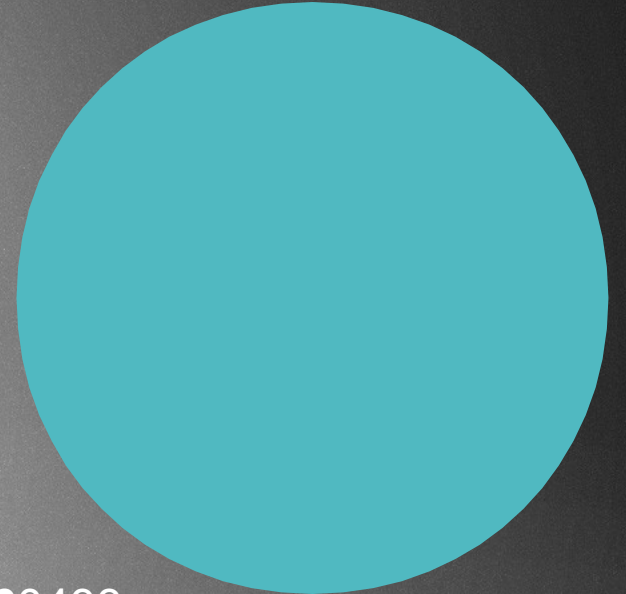
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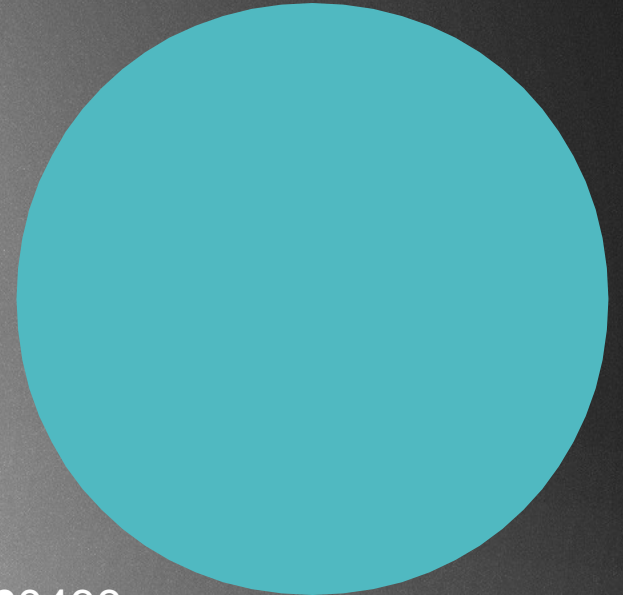
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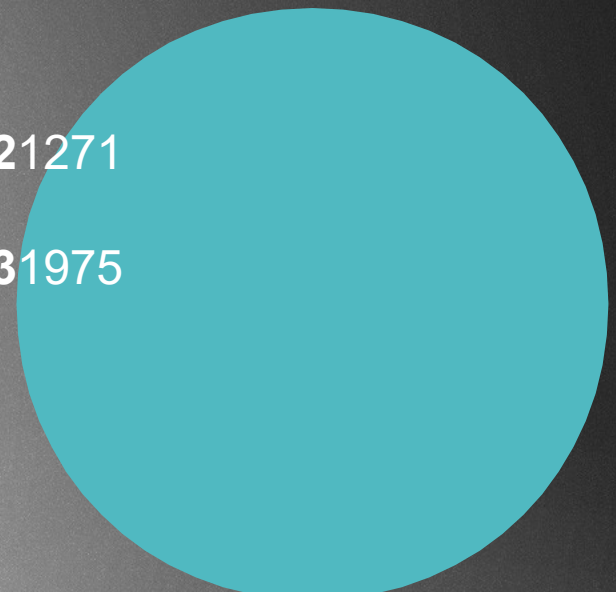
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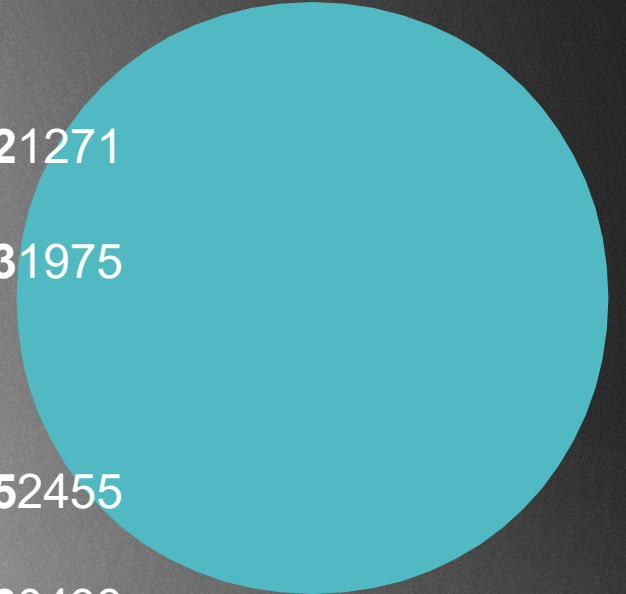
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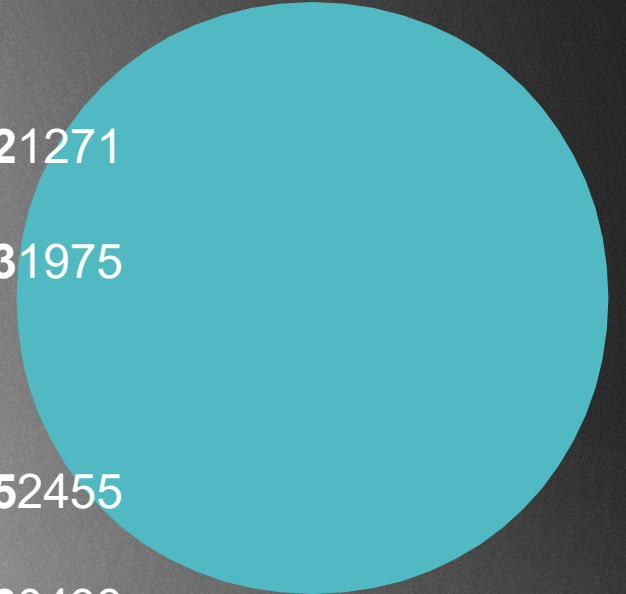
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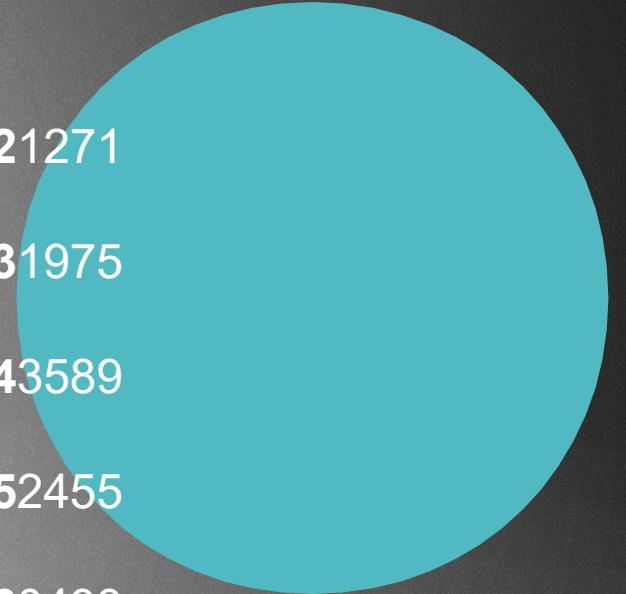
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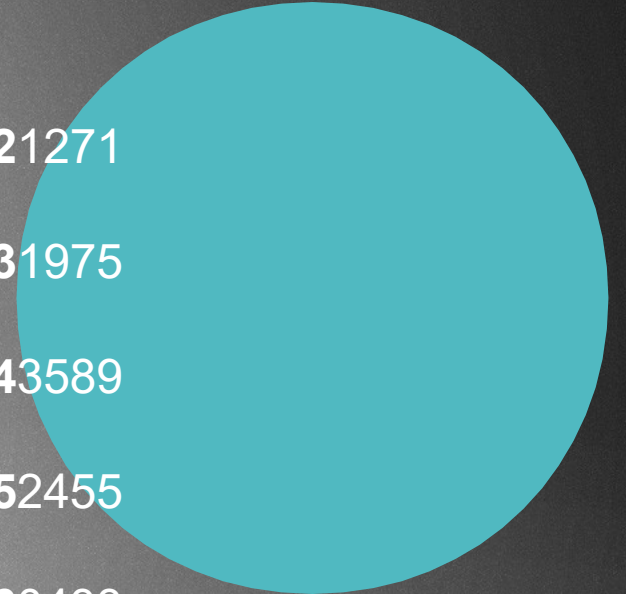
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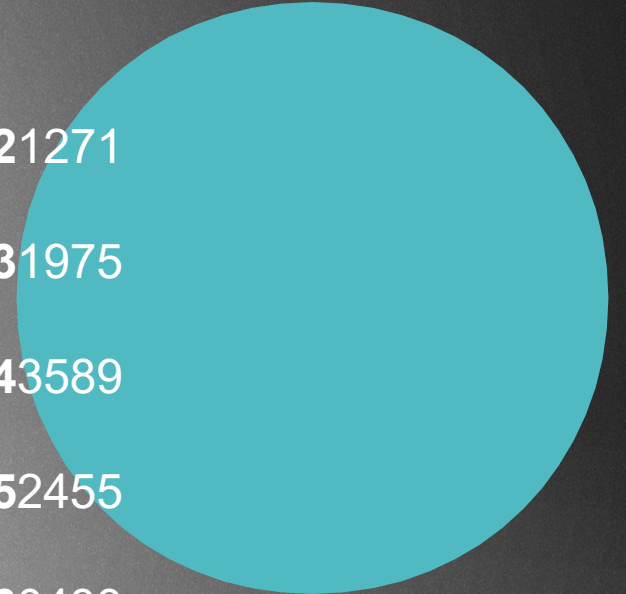
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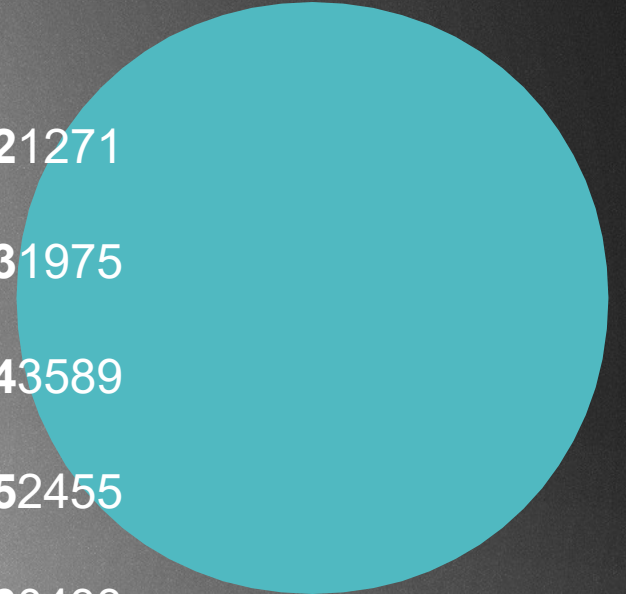
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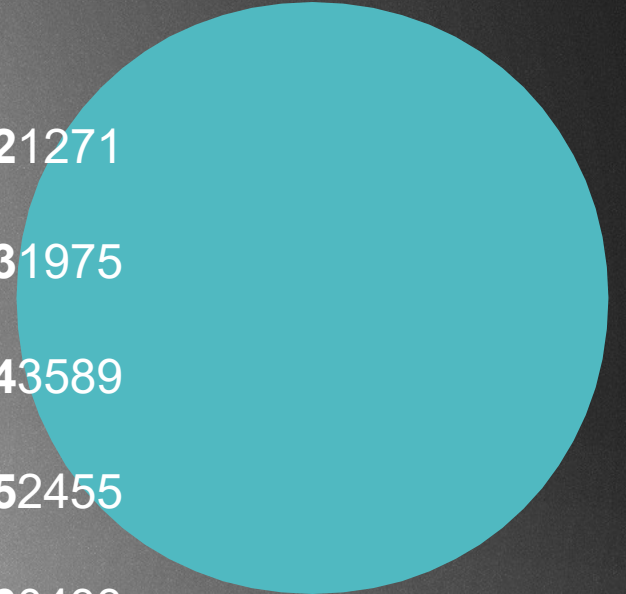
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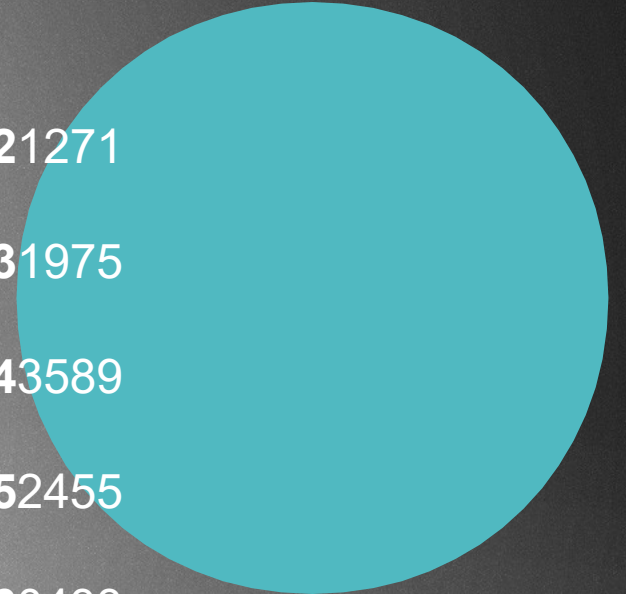
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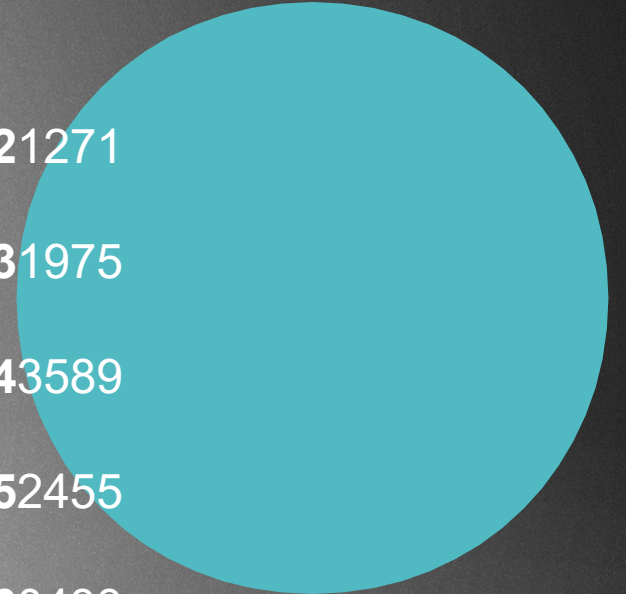
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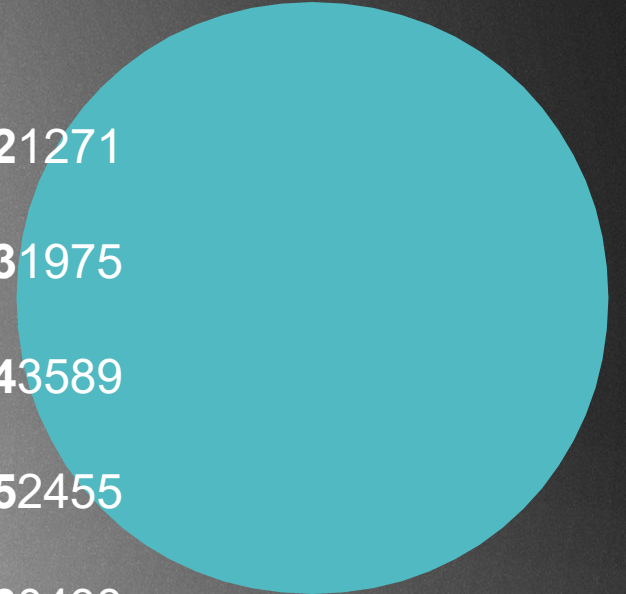
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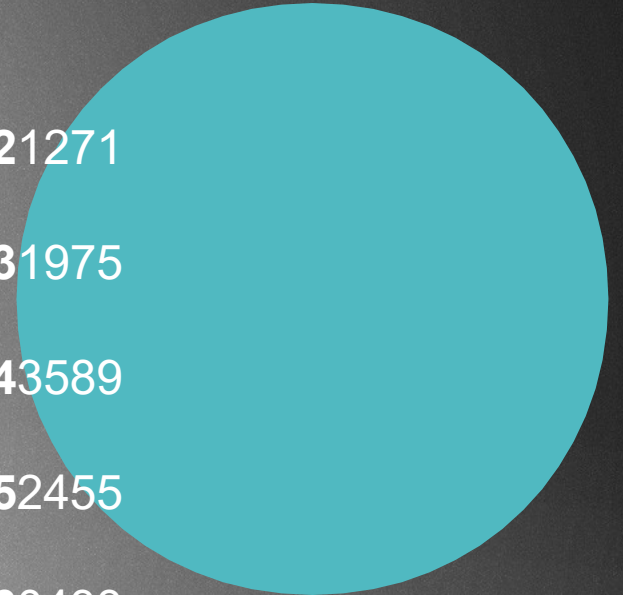
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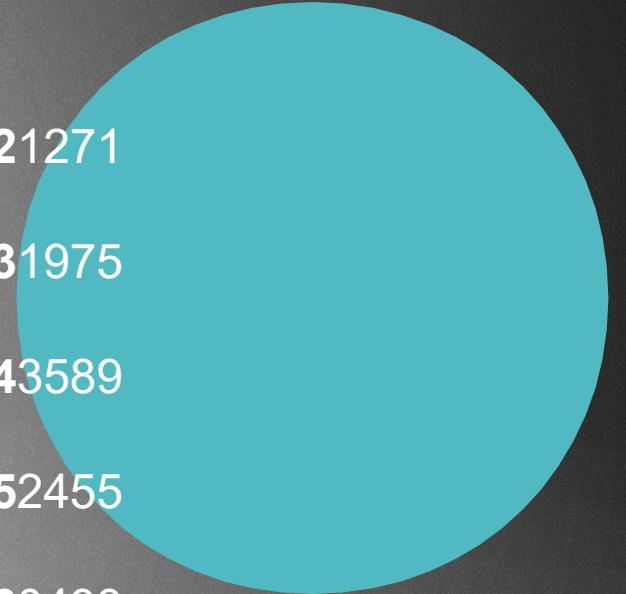
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