Answers
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1.If there are m boundary pixels and $n$pixels inside the hole, what's the complexity of the algorithm that fills the hole, assuming that the hole and boundary were already found? Try to also express the complexity only in terms of n.

Answer:
*The naïve approach raises a complexity of O(n*m). As for every pixel we need to compute its weights regarding boundaries pixels. In most cases number of boundary pixels is much smaller than the number of hole's pixels. For example, A circle has square times more volume than contour. (in average O(n* n^(0.5)).*
But in worse case, when the mask might be just a long snake. The boundary set will have size of 2n. Thus, the complexity of the worst case will be O(n^2)

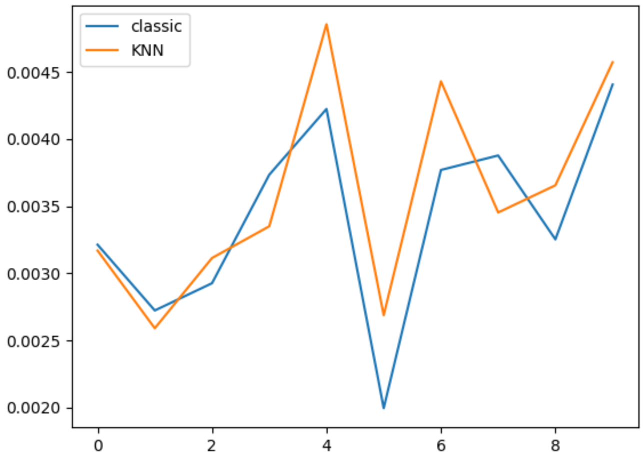
2. Describe an algorithm that approximates the result in $O(n)$ to a high degree of accuracy. As a bonus, implement the suggested algorithm in your library in addition to the algorithm described above.

Answer:
The approximation which raises a complexity of O(n) is possible as following:
Instead of computing and interpolation over all m boundary pixels, I suggest to interpolate over only K nearest boundary pixels

Complexity analysis:
. Extracting K nearest neighbors for given 'hole' pixel takes O(K) time.
*Thus proceeding over N hole pixels takes O(**KN**=O**(N)***

Implementation:
Implementation applied.

Plots:
MSE comparison:
Hole filling over 10 repeations, the MSE Error for both algorithms



Conclusion:
As a conclusion, The KNN mode is very good approximation for the classic algorithm with significant improvement in time complexity