

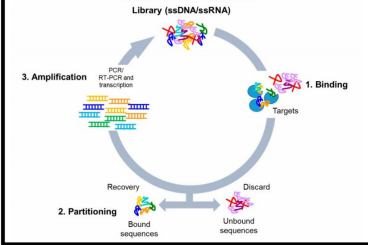
Voronoi Diagram Intensity Extraction for SELEX Performance Enhancement

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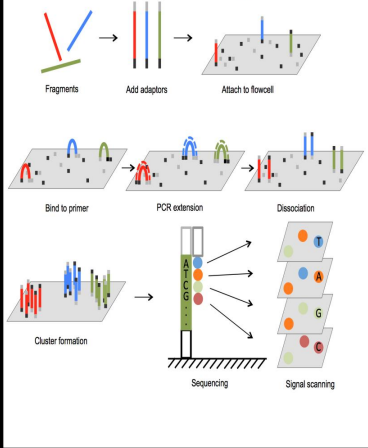
EE367: Computational Imaging



SELEX Process



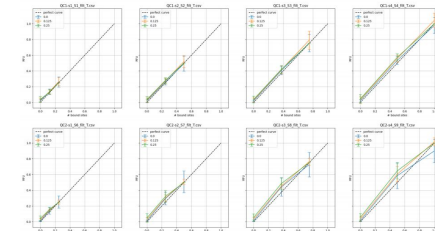
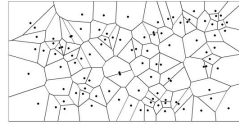
Illumina Miseq



Method

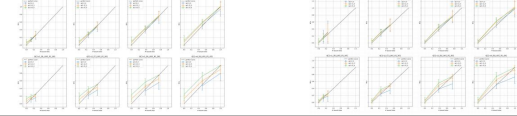
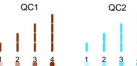
Voronoi Diagram

- Spatial analysis suitable for this domain
- Minimizing intensity spill-over
- Localized intensity calculation
- Clear boundary definition
- Adaptability to Mismatch

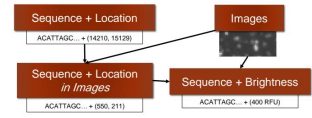


Previous Work

1. Sum together all foreground pixels around a given coordinate
 - + robust against misalignment
 - easily influenced by neighboring clusters
2. Apply deconvolution to the image and read out at location of the coordinate
 - + can improve signal-to-noise ratio
 - + mathematically decouples neighboring clusters
 - slow
 - assumes clusters to be shaped the same
 - not robust against misalignment
3. Apply interpolation between pixels and read out at location of coordinate
 - ? influence by neighboring clusters
 - potentially not robust against misalignment

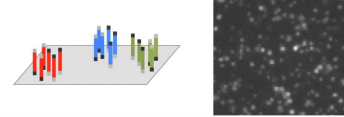


Data Processing Pipeline



Imaging Platform

- Trick:** Transduce aptamer binding behavior to fluorescence
- Fluorescently labelled target
 - Fluorescent complementary displacement strand
 - Fluorescently modify aptamers + some quenching mechanism



References

- [1] Lu, Yuan, et al. "Next generation sequencing in aquatic models." Next Generation Sequencing: Advances, Applications and Challenges 1 (2016): 13.
- [2] A deep learning model for predicting next-generation sequencing depth from DNA sequence, J. X. Zhang et. al., 2021
- [3] Predicting DNA hybridization kinetics from sequence, J. X. Zhang et. al., 2017