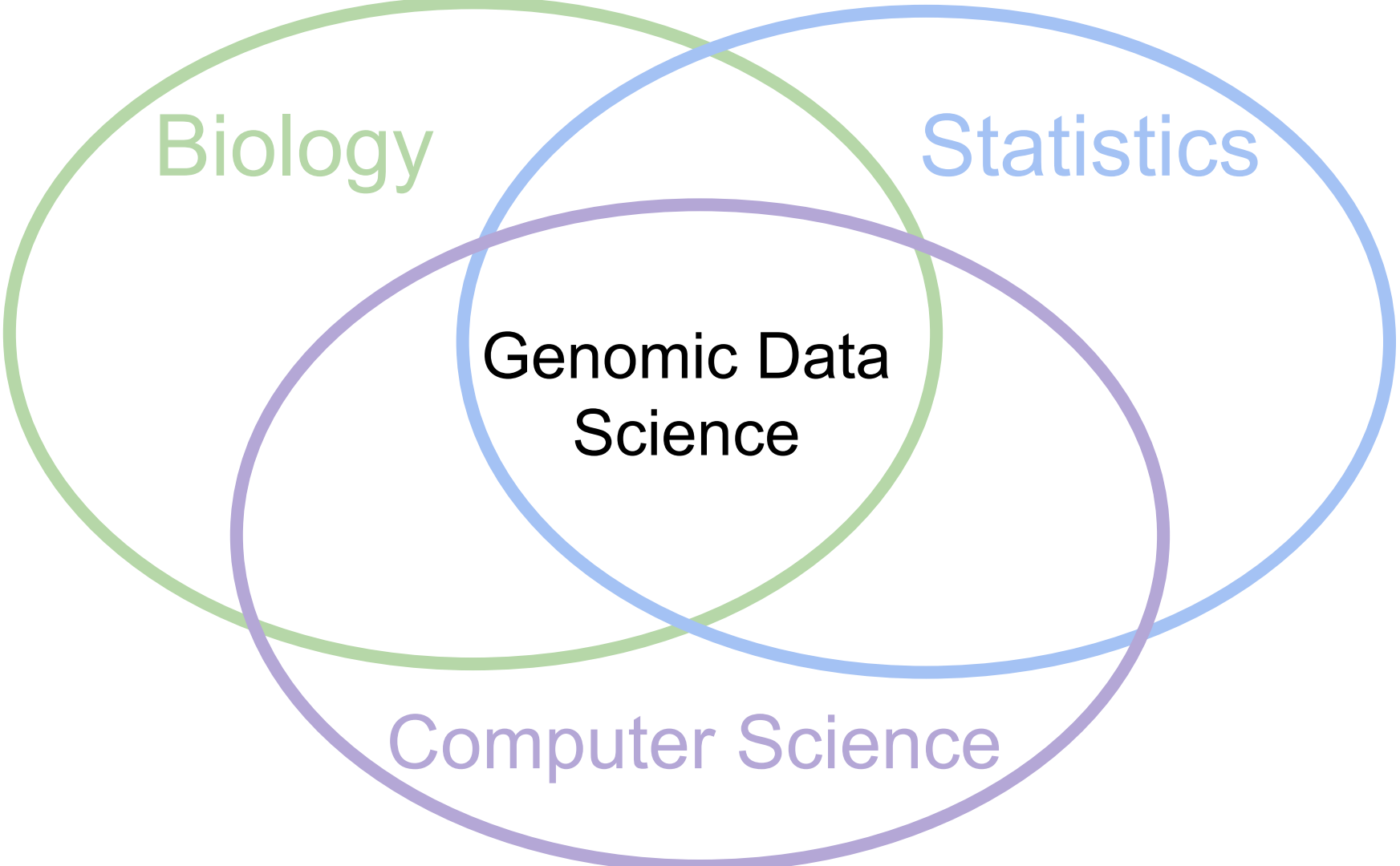
What is genomic data science?

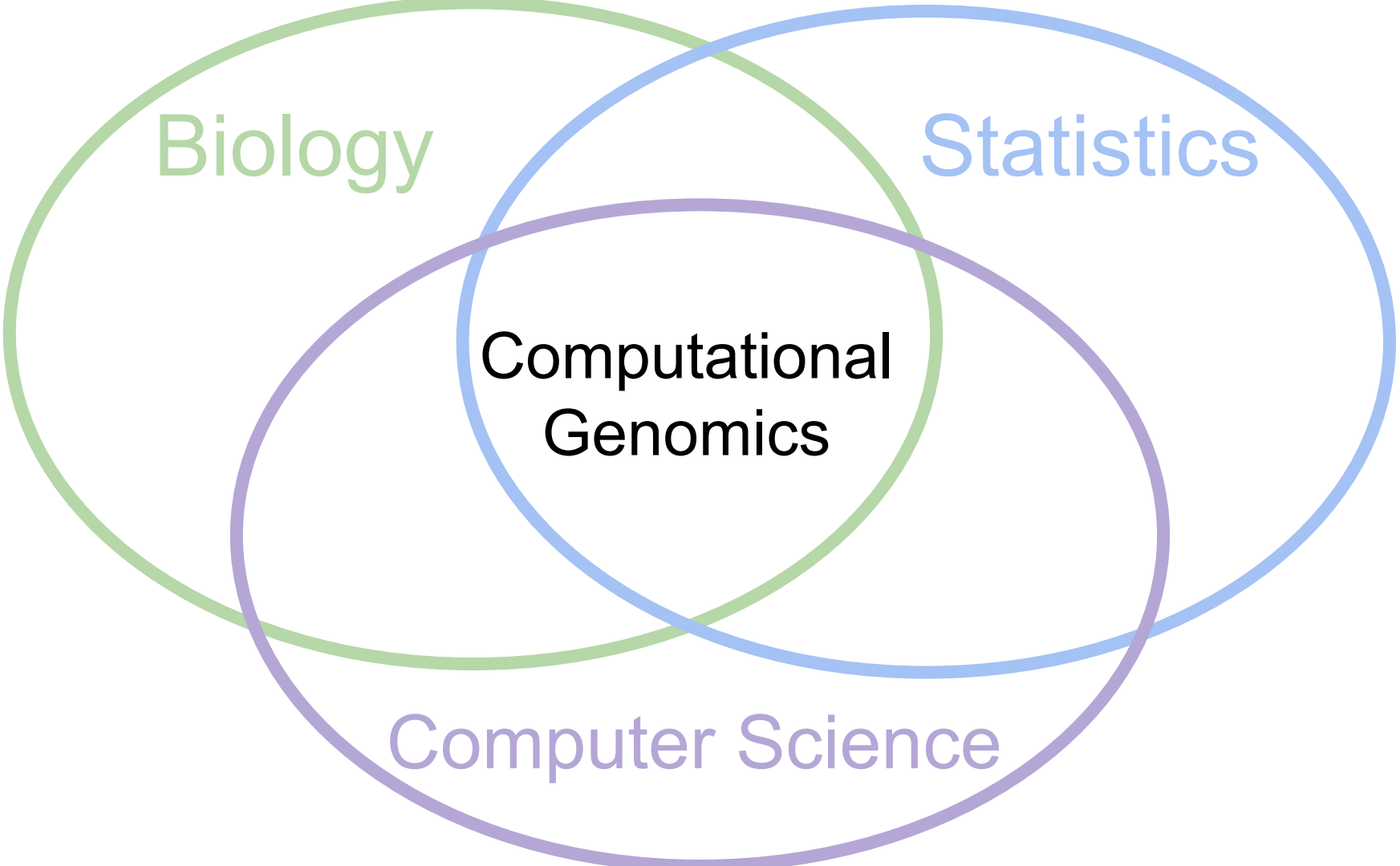
Steven Salzberg

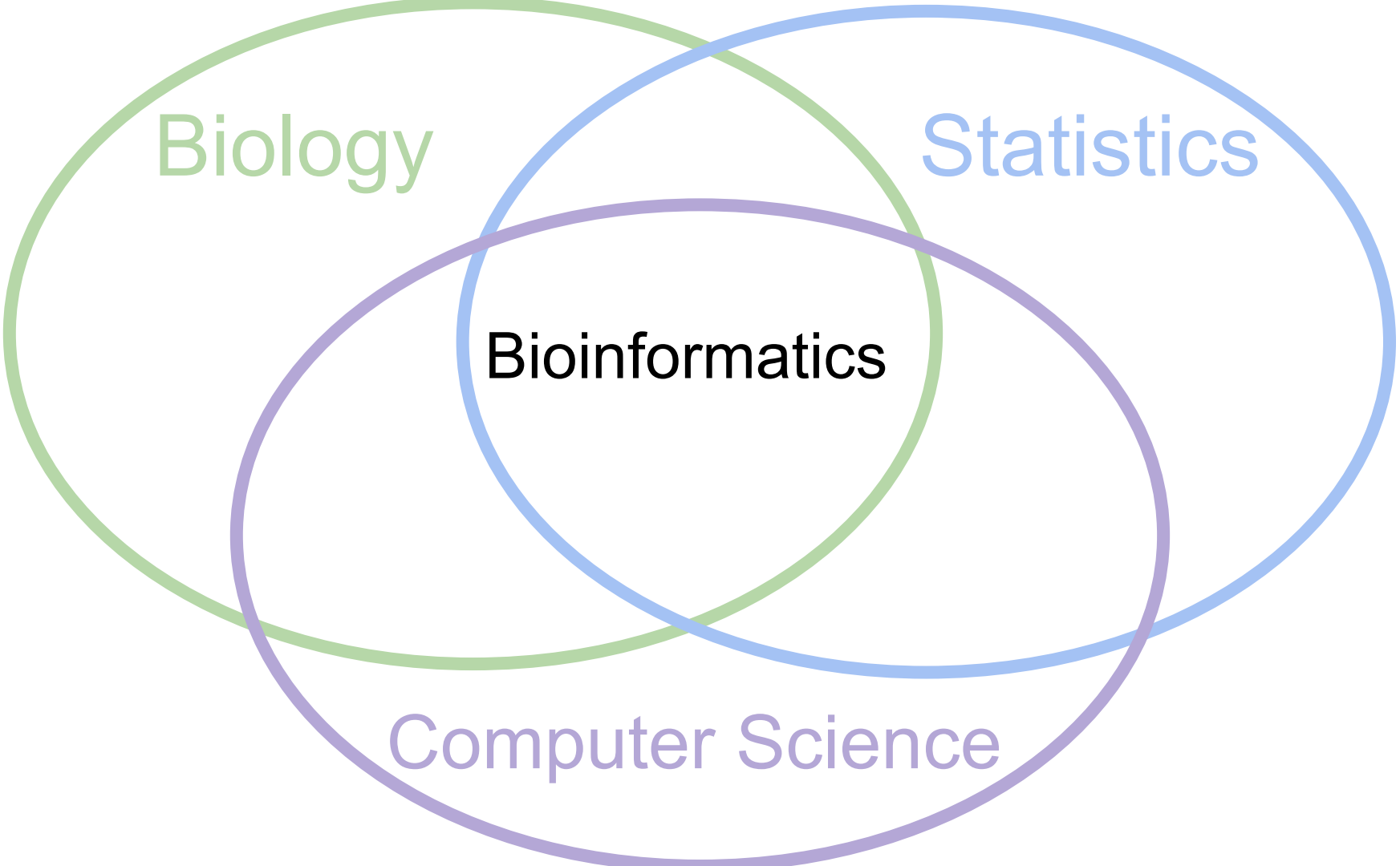
Intersection of three disciplines

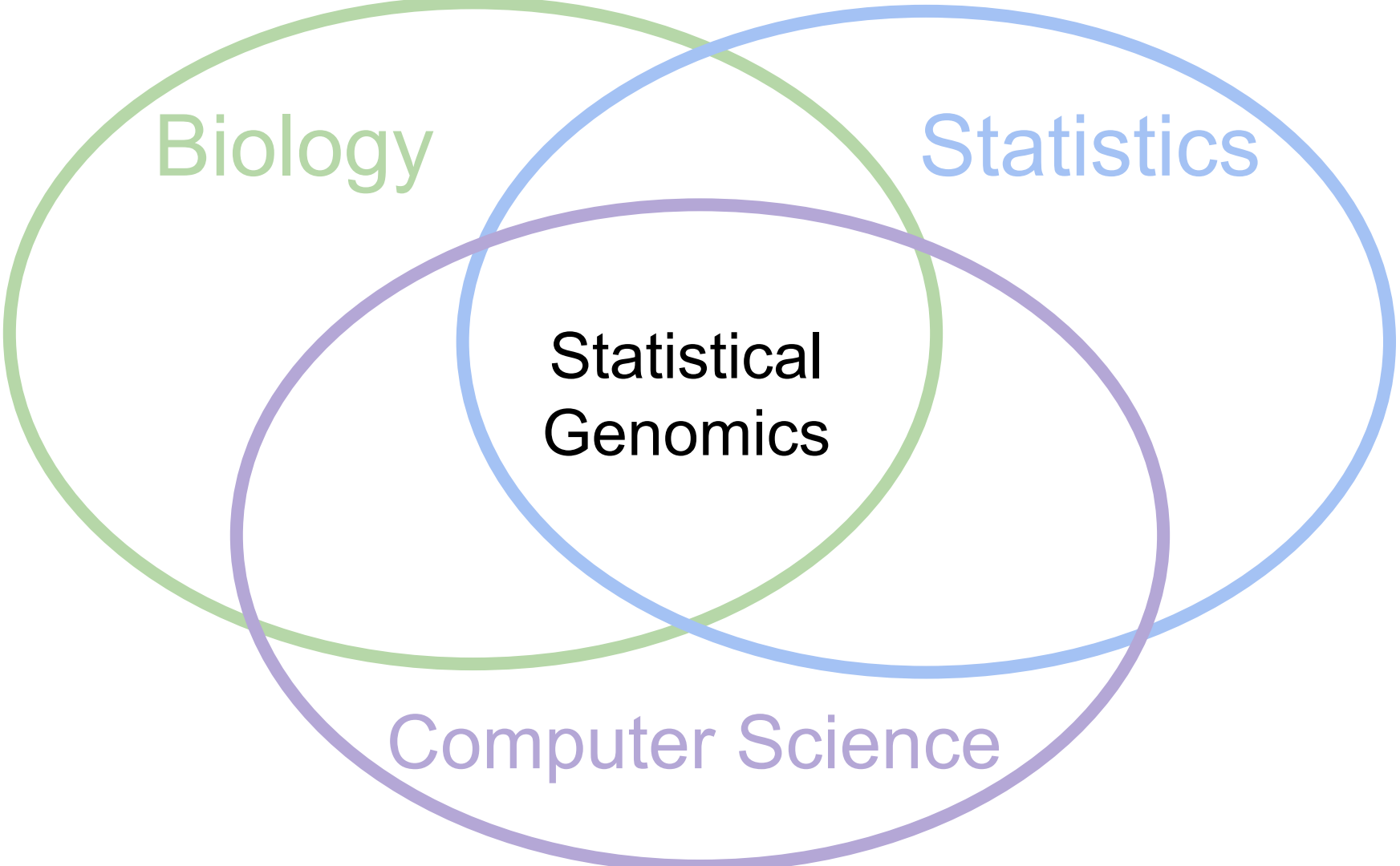
- biology
- statistics
- computer science


Biology
Statistics
Genomic Data Science
Computer Science

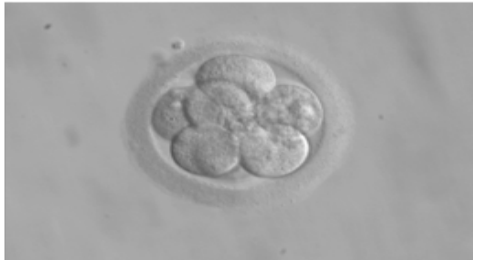
Genomic data science has multiple names


Biology
Statistics
Computational
Genomics
Computer Science


Biology
Statistics
Bioinformatics
Computer Science


Biology
Statistics
Statistical
Genomics
Computer Science

What do genomic data scientists do?



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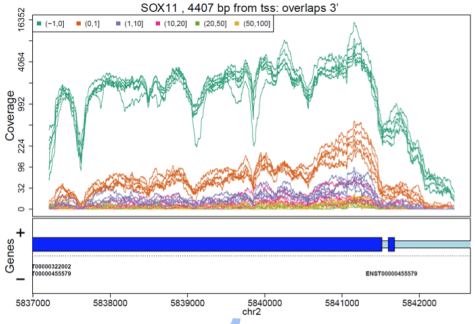
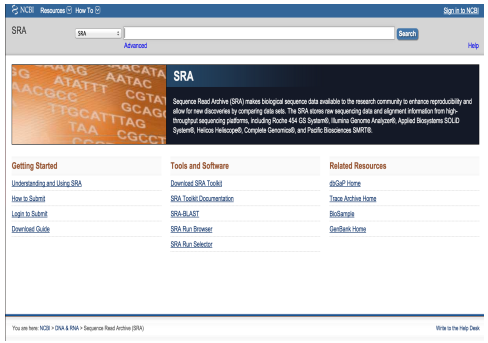


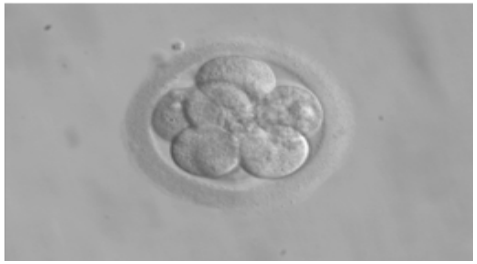


$$g(Y_{ij}) = \alpha(l_j) + \beta(l_j)X_i + \sum_{k=1}^{K} \gamma_k(l_j)W_{ik} + \varepsilon_{ij}$$

Galaxy

Bioconductor

OPEN SOURCE SOFTWARE FOR BIOINFORMATICS



experimental design

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alignment & assembly

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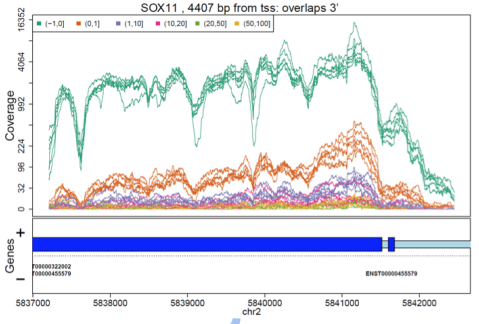

preprocessing & normalization

statistics & machine learning

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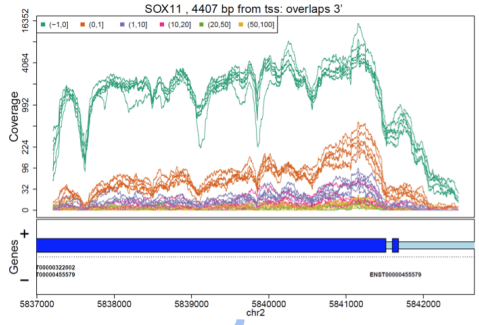
TACAAAATCAGATCGATCGAGATCAGTC

$$g(Y_{ij}) = \alpha(l_j) + \beta(l_j)X_i + \sum_{k=1}^{K} \gamma_k(l_j)W_{ik} + \varepsilon_{ij}$$



software development

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$$g(Y_{ij}) = \alpha(t_j) + \beta(t_j)X_i + \sum_{k=1}^{K}\gamma_k(t_j)W_{ik} + \varepsilon_{ij}$$

population genomics

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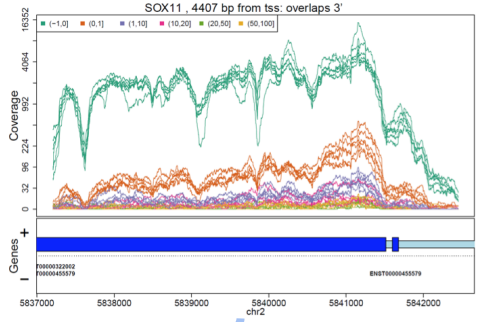
$$g(Y_{ij}) = \alpha(l_j) + \beta(l_j)X_i + \sum_{k=1}^{K} \gamma_k(l_j)W_{ik} + \varepsilon_{ij}$$



integrative genomics

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$$g(Y_{ij}) = \alpha(l_j) + \beta(l_j)X_i + \sum_{k=1}^{K} \gamma_k(l_j)W_{ik} + \varepsilon_{ij}$$