



NIR hyperspectral imaging of fire impregnated wood

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Motivation



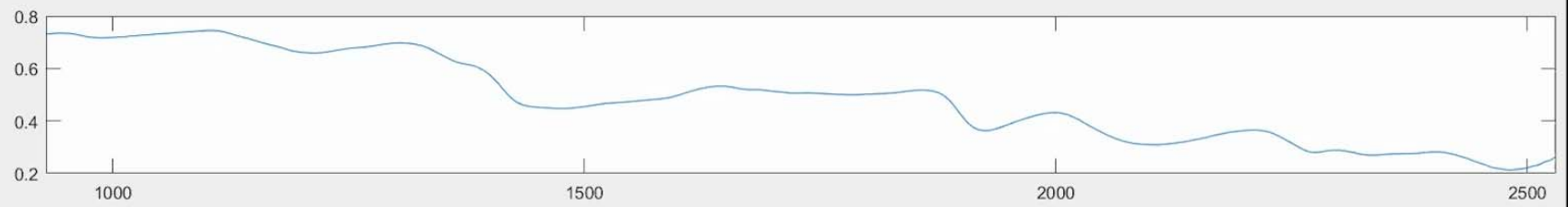
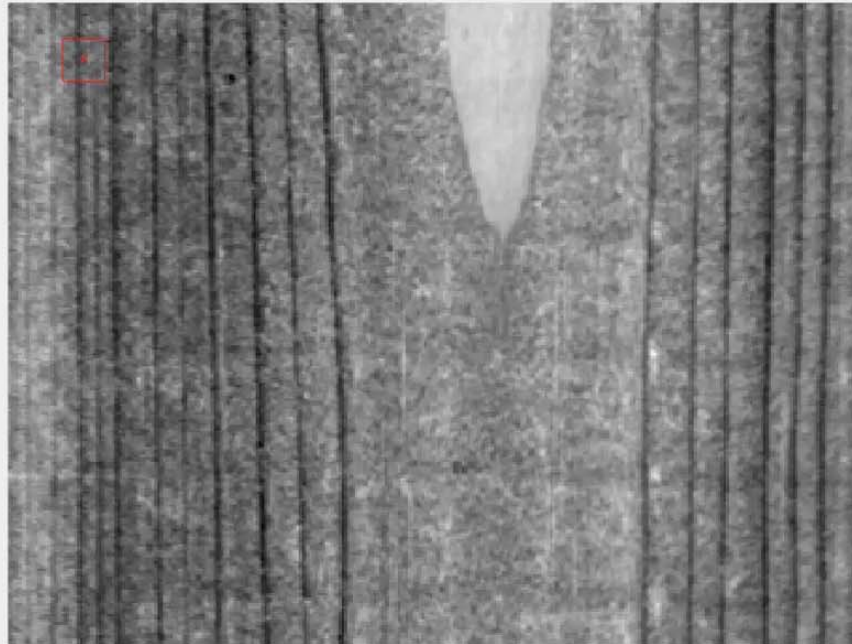
- Can we measure the concentration of fire retardant material at a certain wavelength range ?
- Can we mount a sensor on a drone to see if a fire retardant treated surface needs maintenance ?

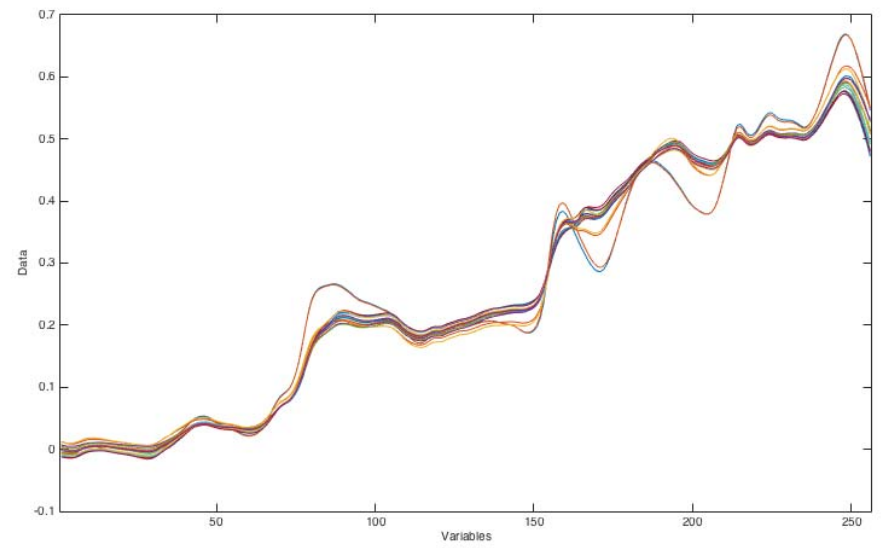
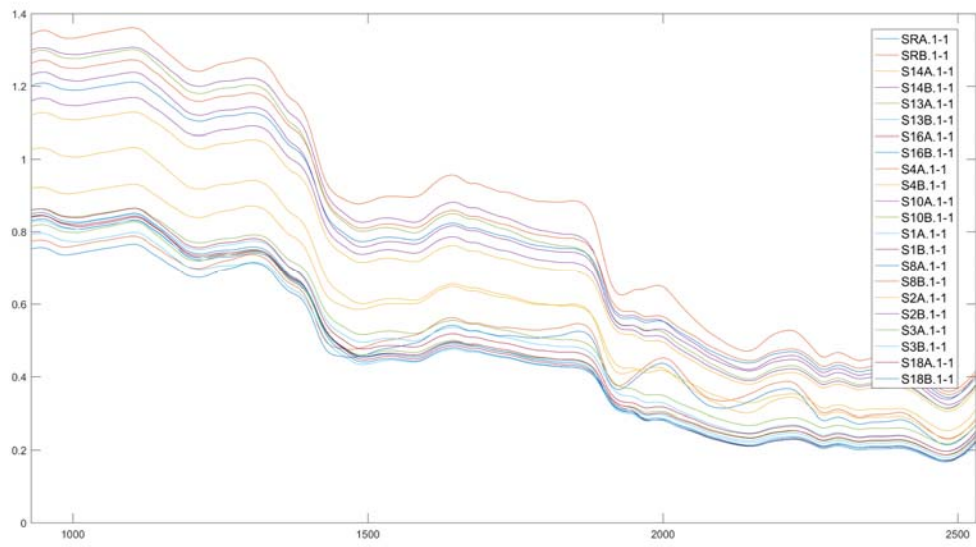
NIR hyperspectral camera

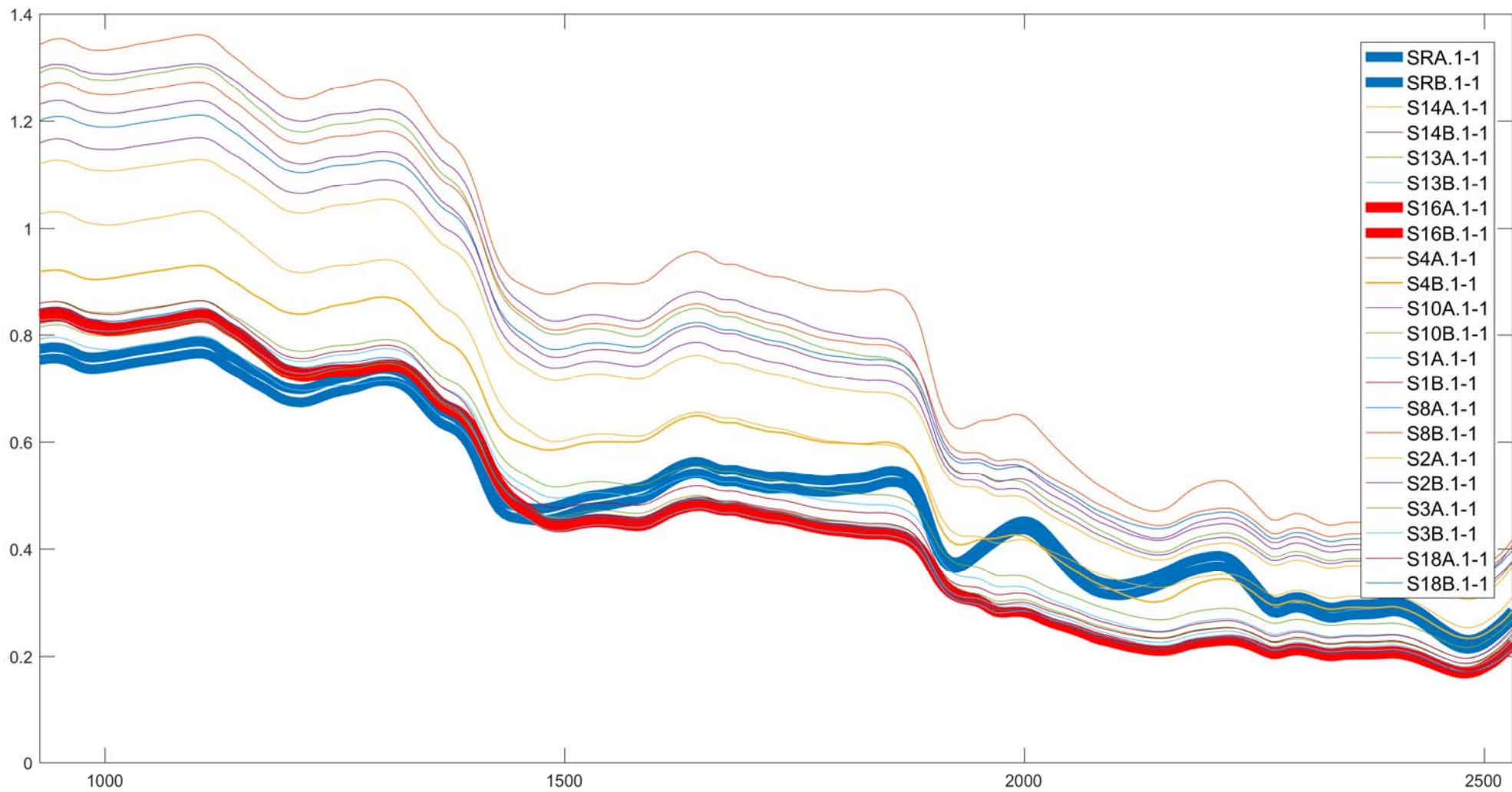
1000 – 2500 nm

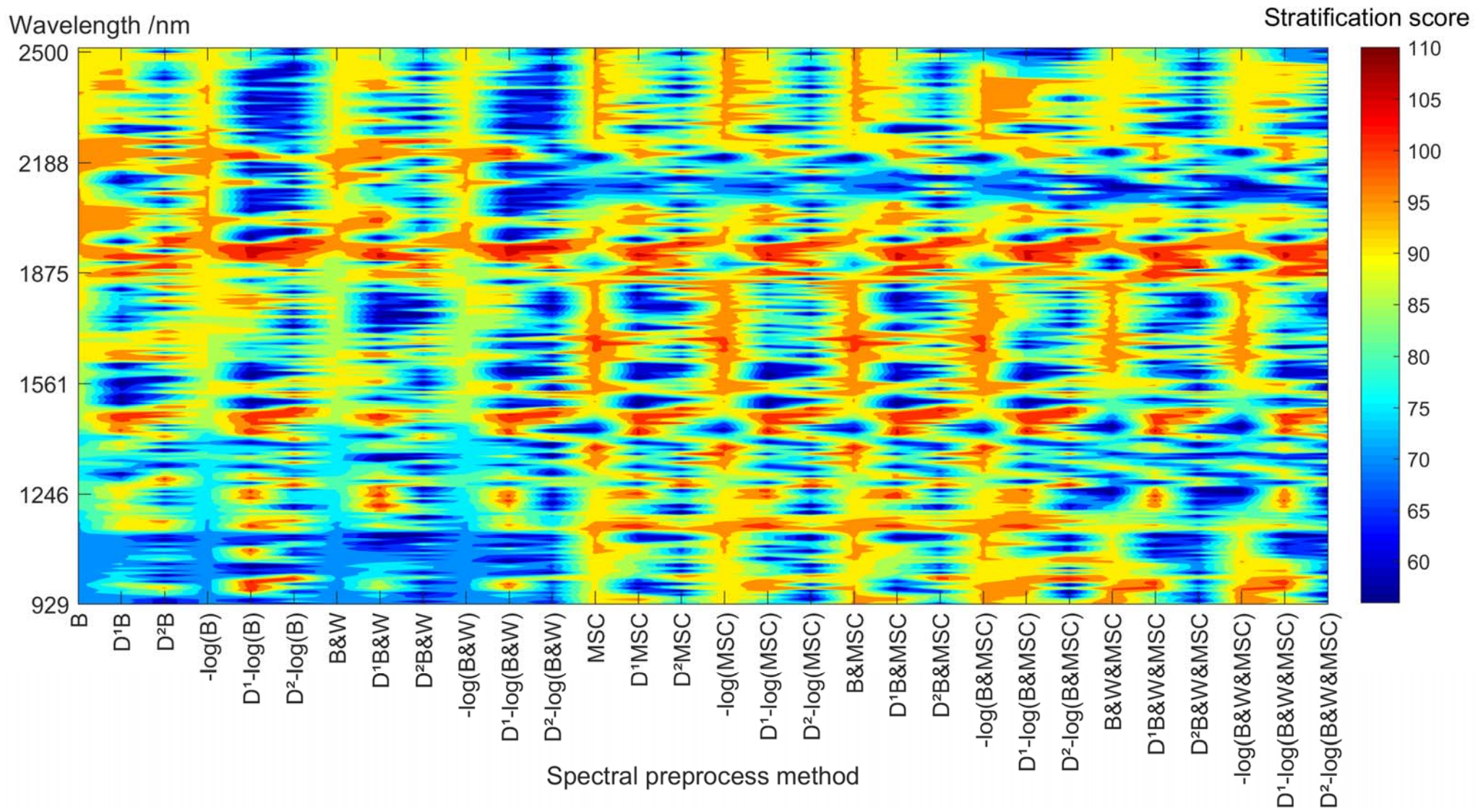
Spatial resolution 100 microns

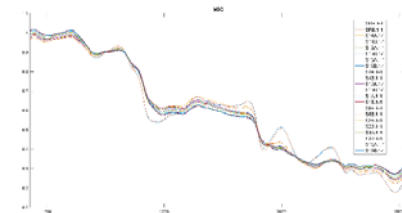
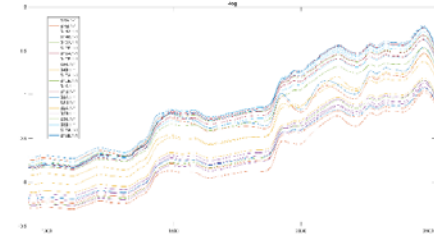
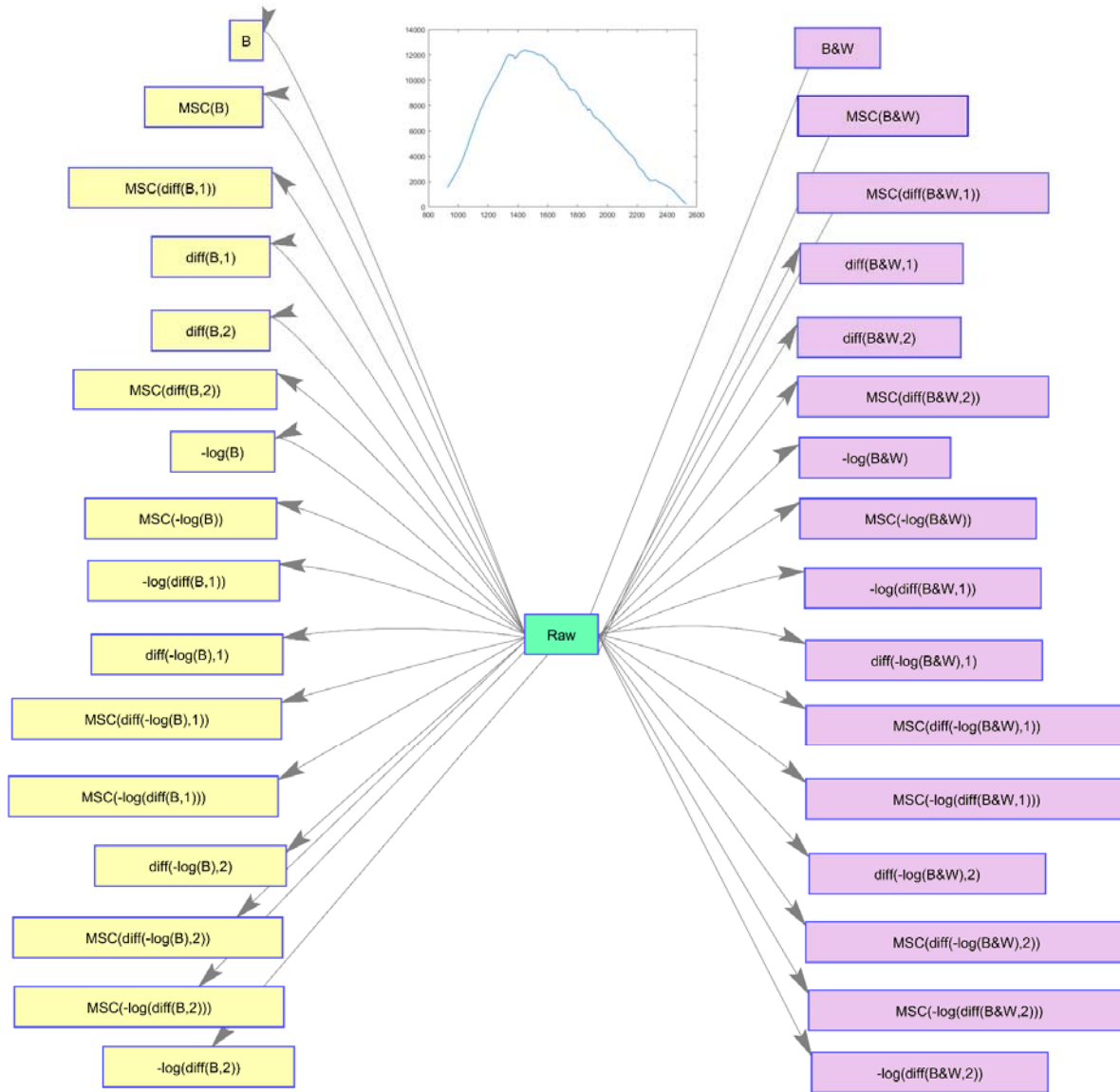
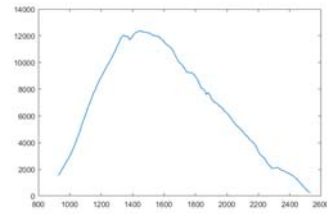
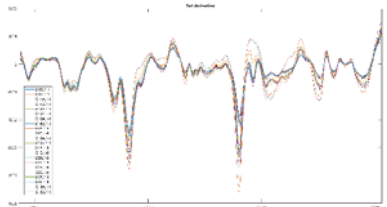
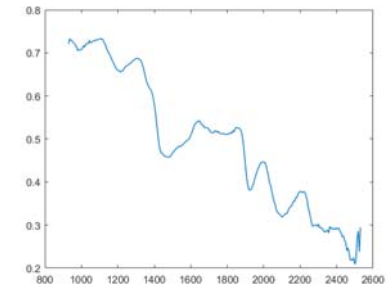




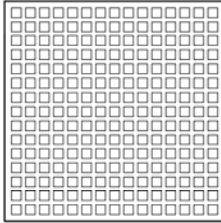




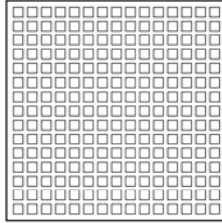




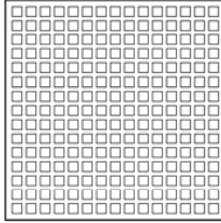
SRA.1-1 (0.00)



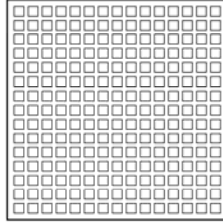
SRB.1-1 (0.00)



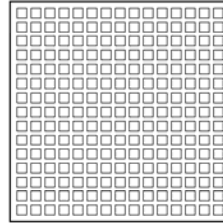
S14A.1-1 (0.17)



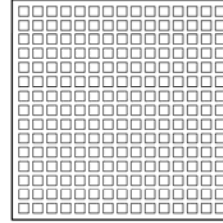
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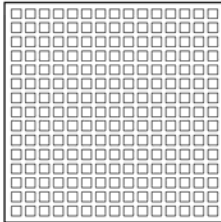
S13A.1-1 (0.29)



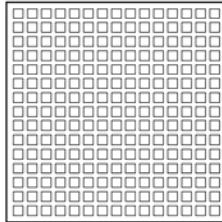
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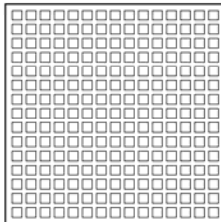
S16A.1-1 (0.55)



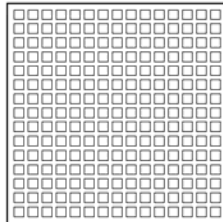
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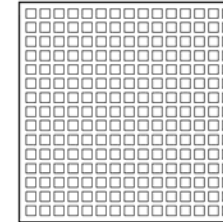
S4A.1-1 (0.03)



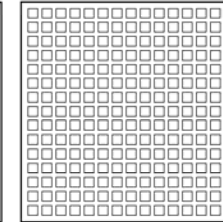
S4B.1-1 (0.03)



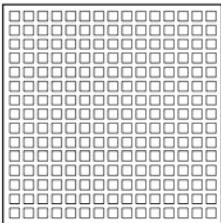
S10A.1-1 (0.15)



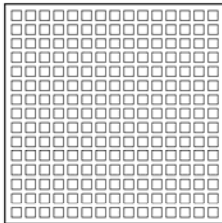
S10B.1-1 (0.15)



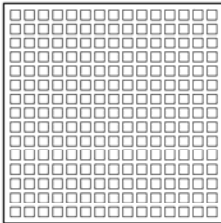
S1A.1-1 (0.24)



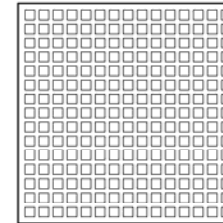
S1B.1-1 (0.24)



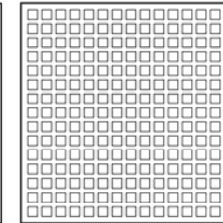
S8A.1-1 (0.16)



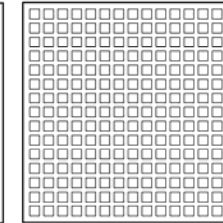
S8B.1-1 (0.16)



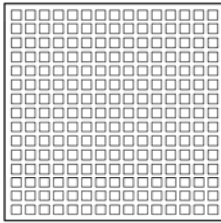
S2A.1-1 (0.21)



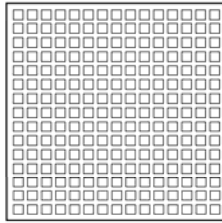
S2B.1-1 (0.21)



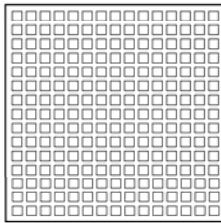
S3A.1-1 (0.25)



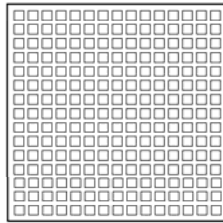
S3B.1-1 (0.25)

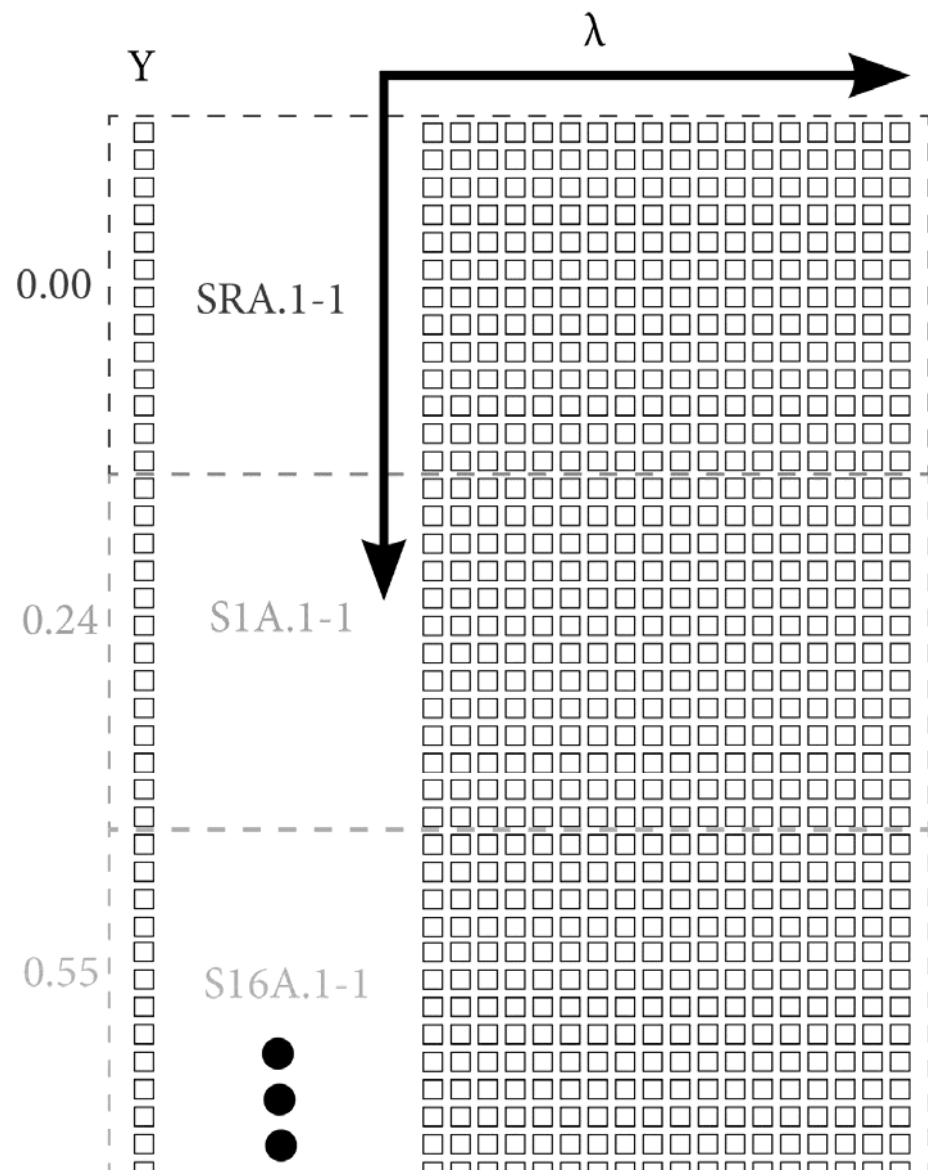


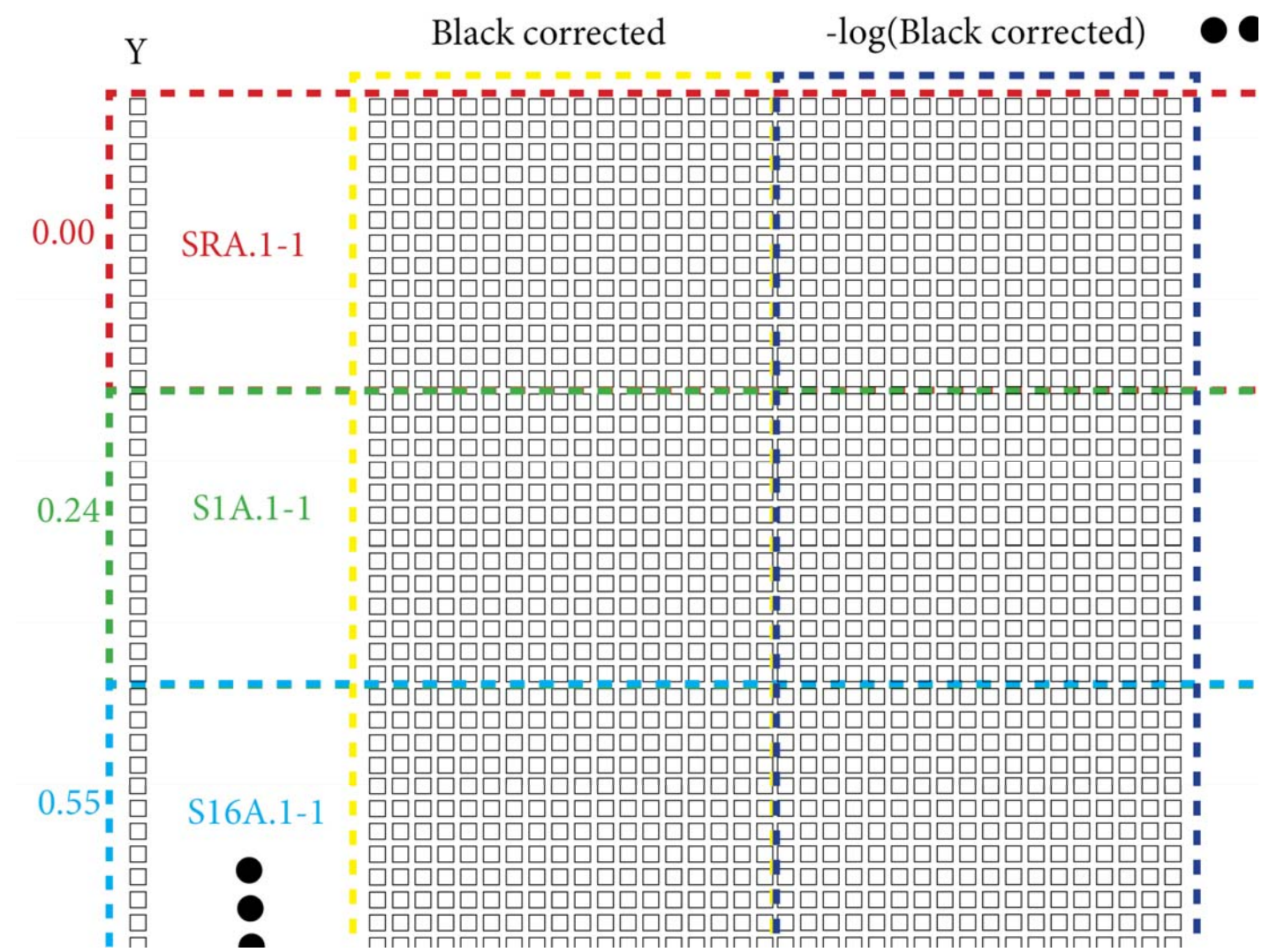
S18A.1-1 (0.47)



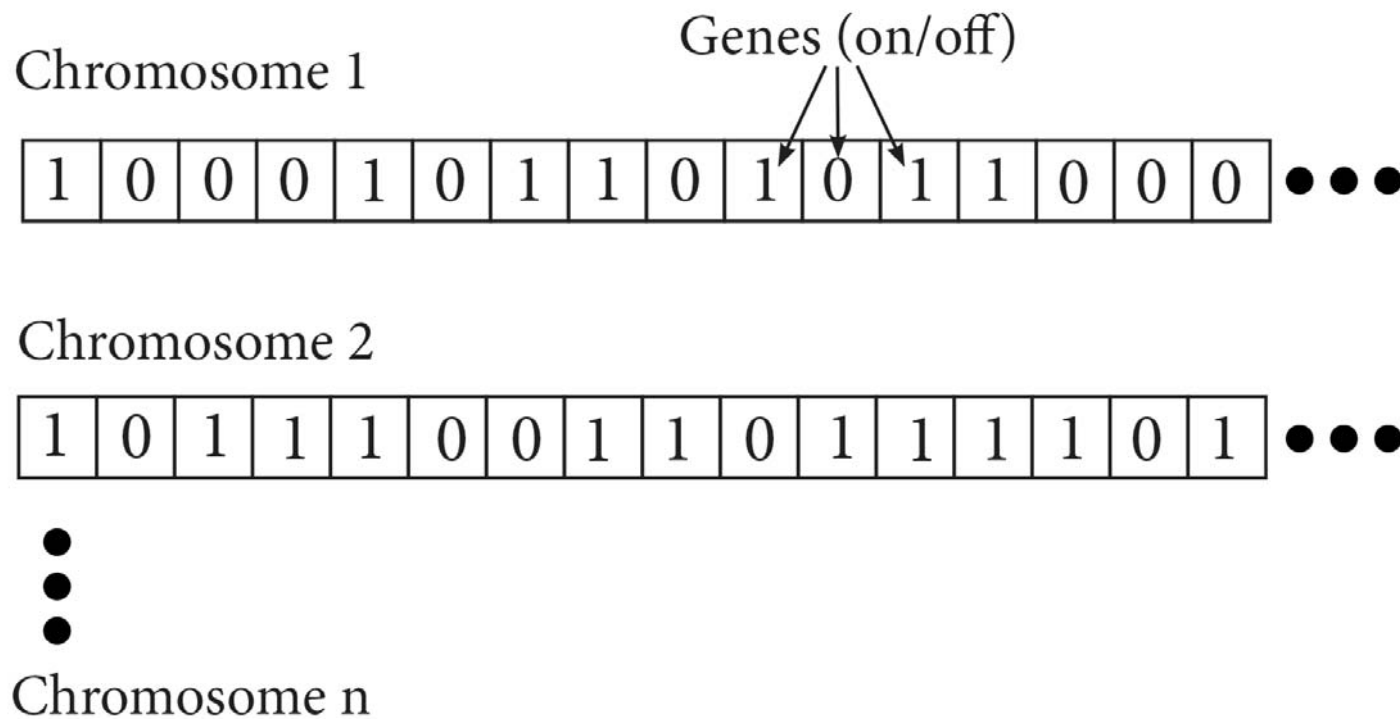
S18B.1-1 (0.47)





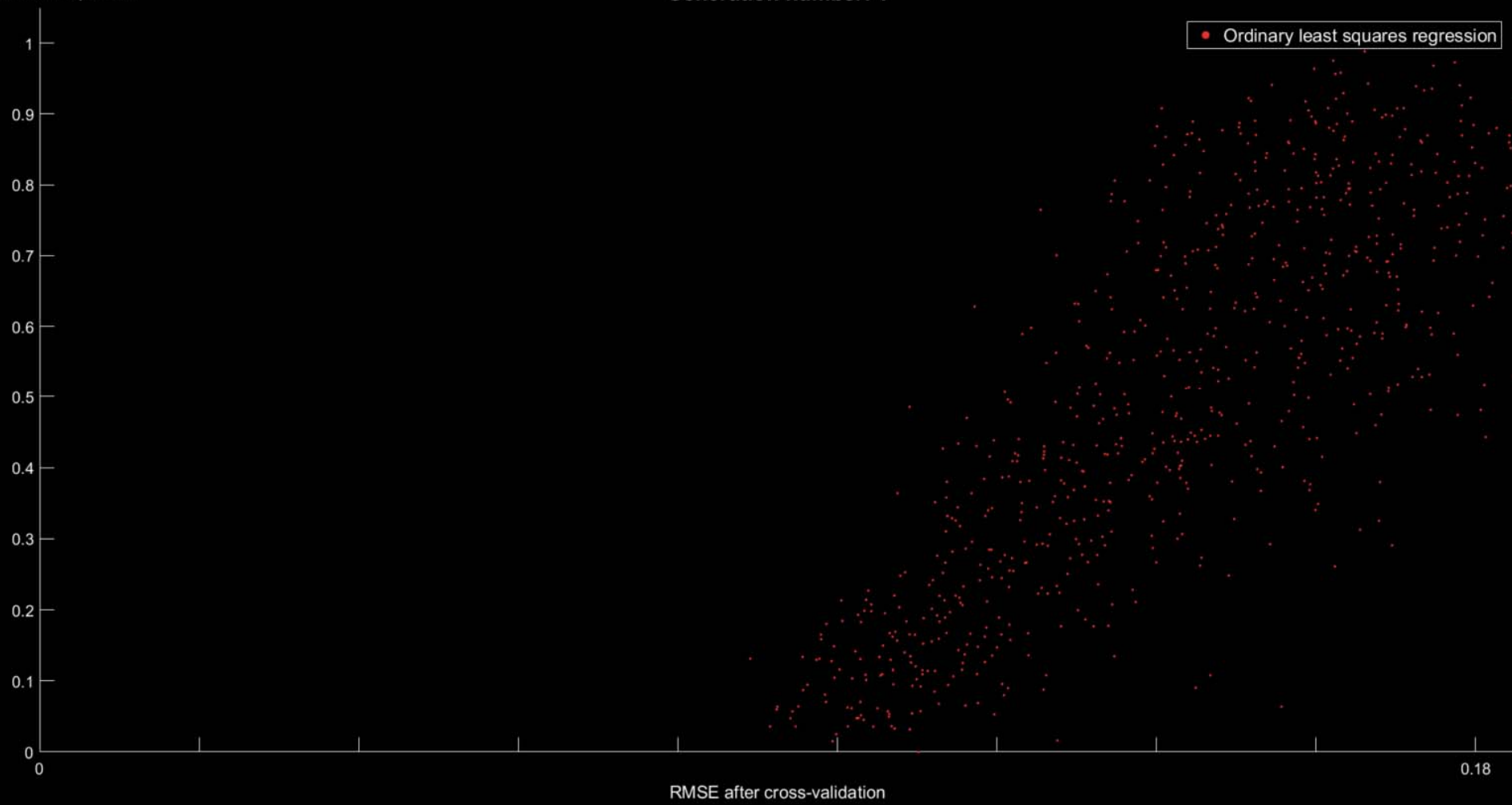


Genetic algorithm for variable selection



Chromosome uniqueness

Generation number: 1



Parent 1



Child for next generation

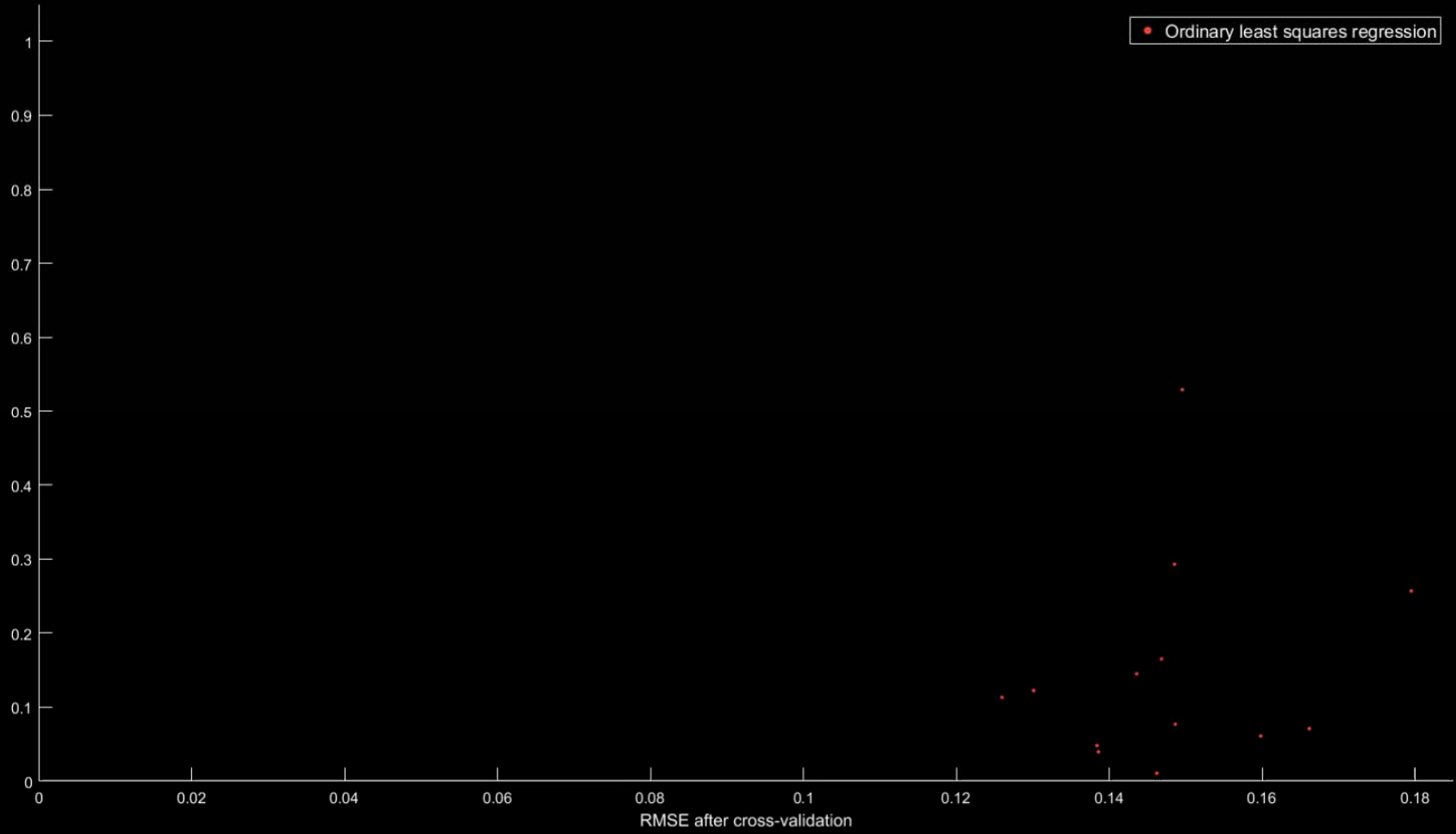


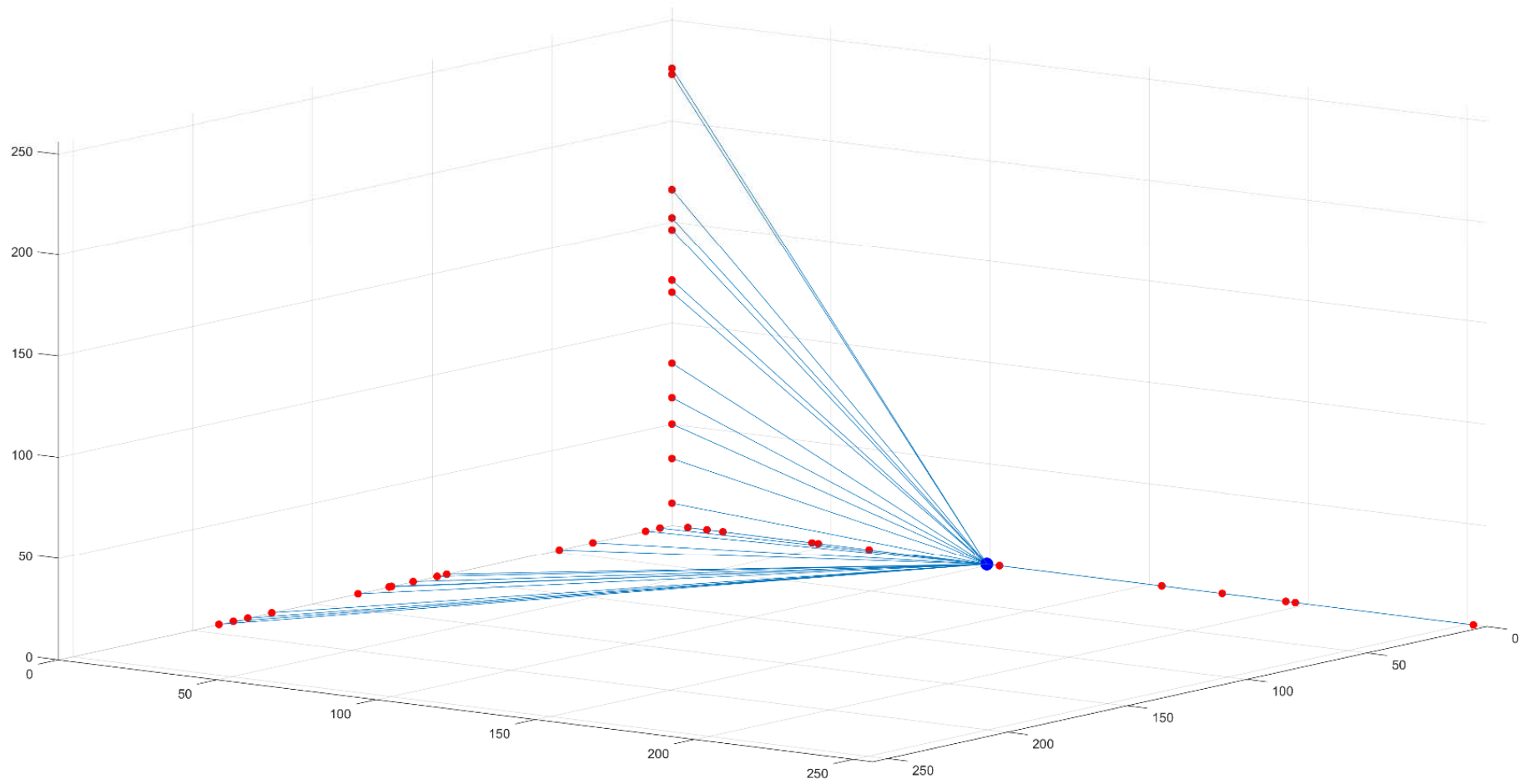
Parent 2

Chromosome uniqueness

Generation number: 1

• Ordinary least squares regression

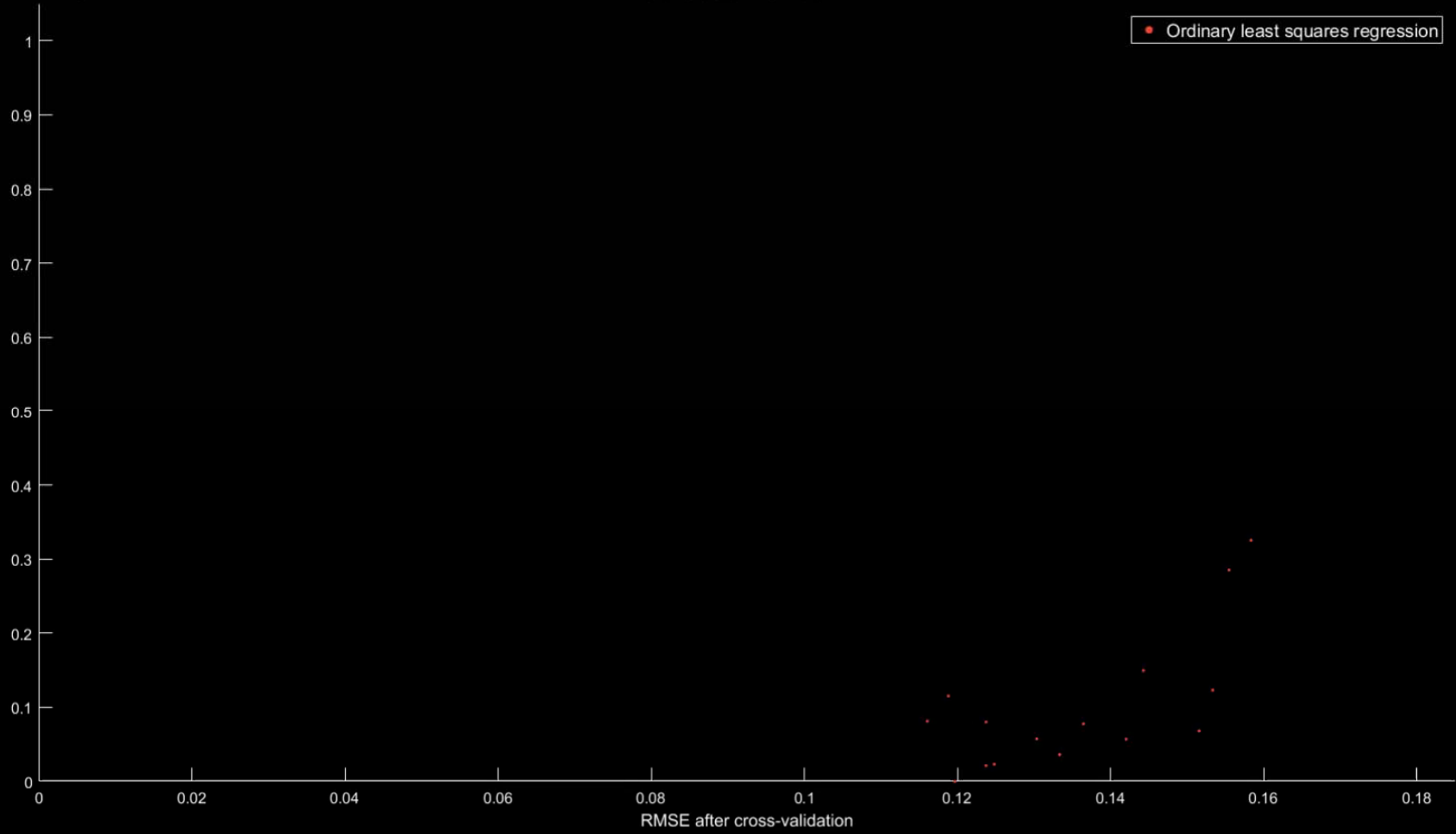




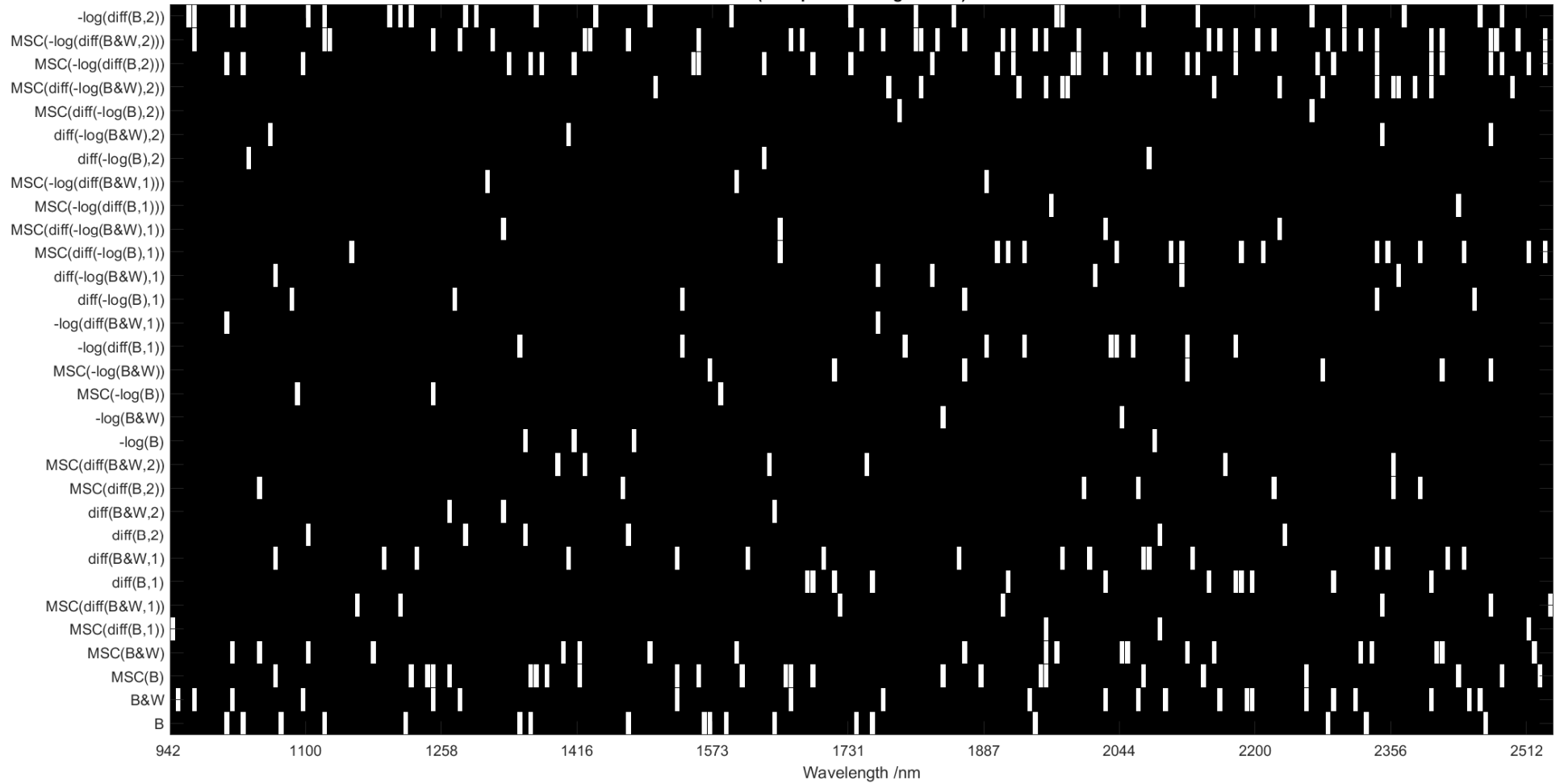
Chromosome uniqueness

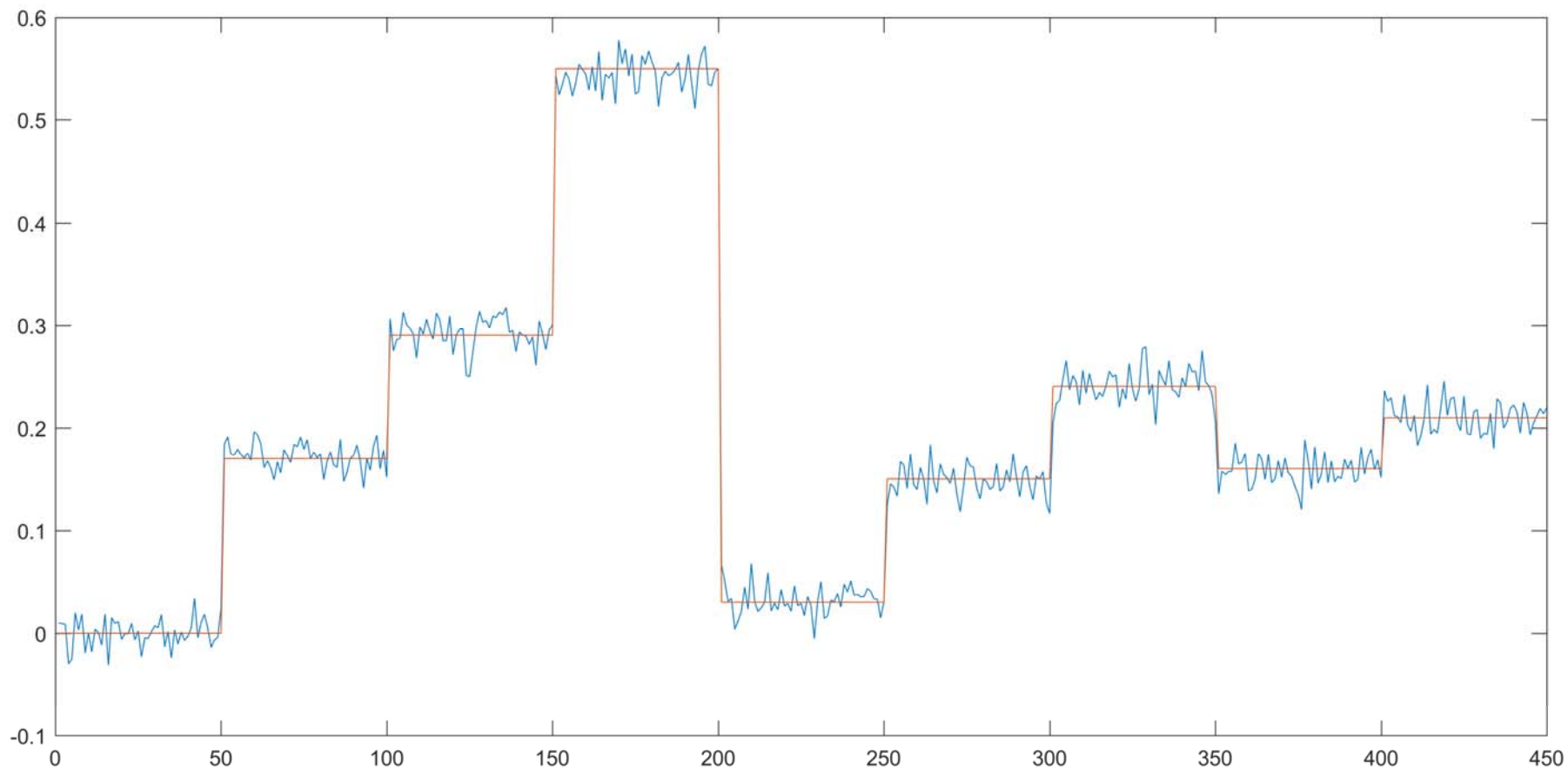
Generation number: 1

• Ordinary least squares regression



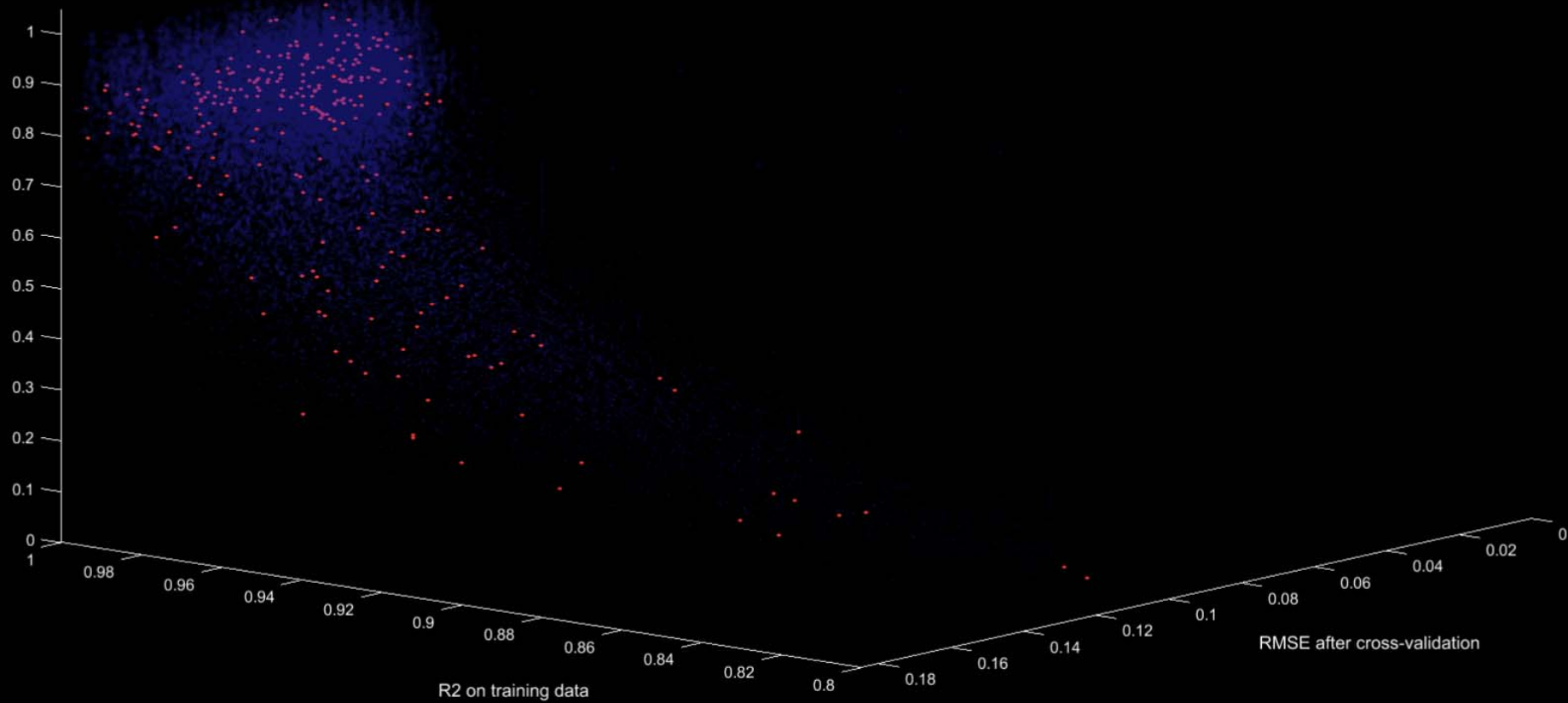
Active genes in best performing chromosome
(multiple linear regression)





• Ordinary least squares regression

Chromosome uniqueness



Now what ??....

- Generic algorithm has potential
- Risk of overfitting
- Improve algorithm
- Explore more robust regression methods

- Suggestions ?