

A MARKOV RANDOM FIELDS APPROACH TO THE GATING OF FLOW CYTOMETRY DATA

Kevin Brosnan, University of Limerick

PRESENTATION OUTLINE

- ⑥ Flow Cytometry
- ⑥ Existing methods
- ⑥ Markov Random Fields
- ⑥ Identifying Clusters
- ⑥ Results
- ⑥ Further Work

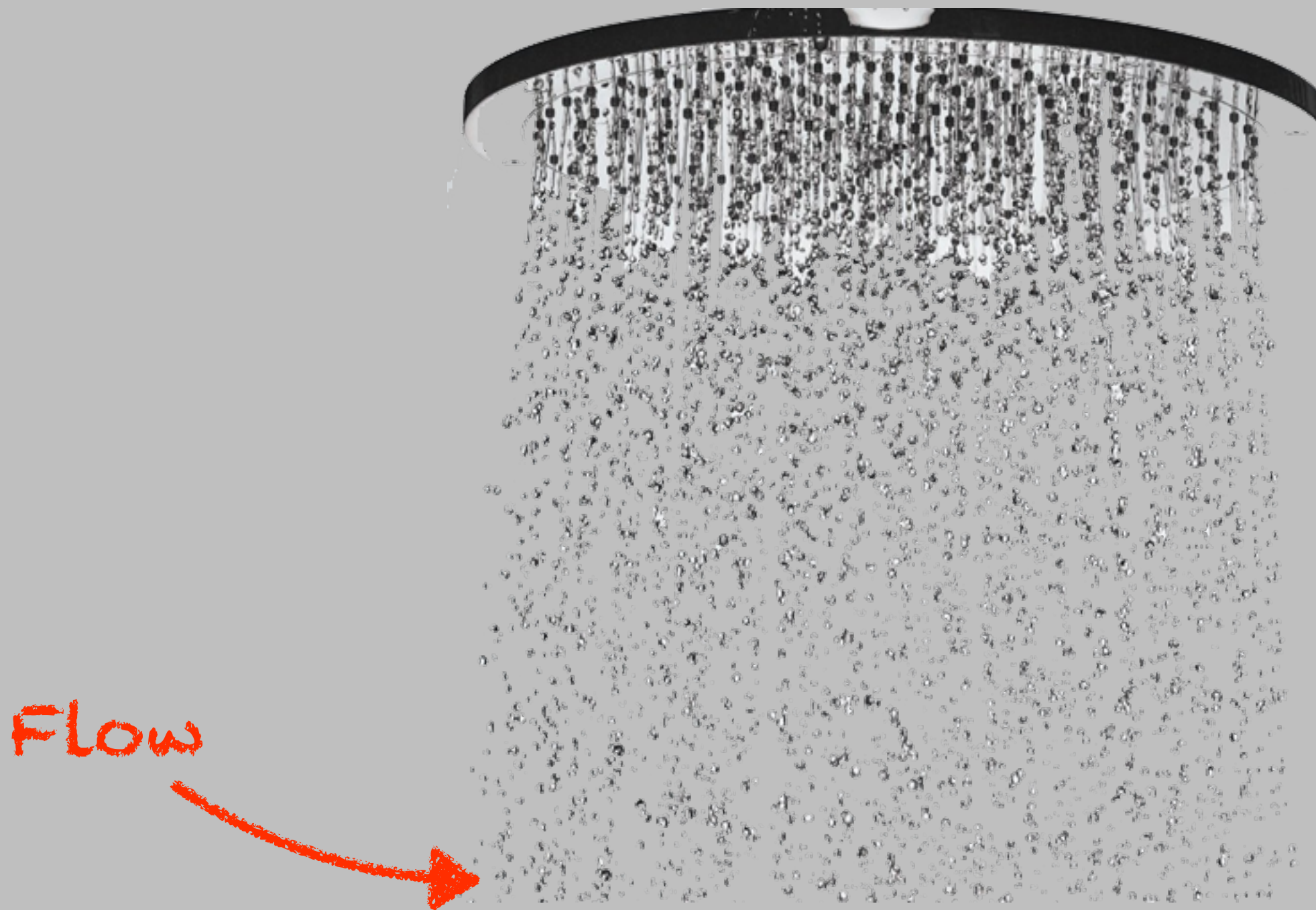


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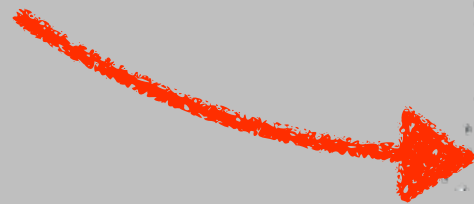
FLOW CYTOMETRY...

What is flow cytometry?

What is flow cytometry?



Flow



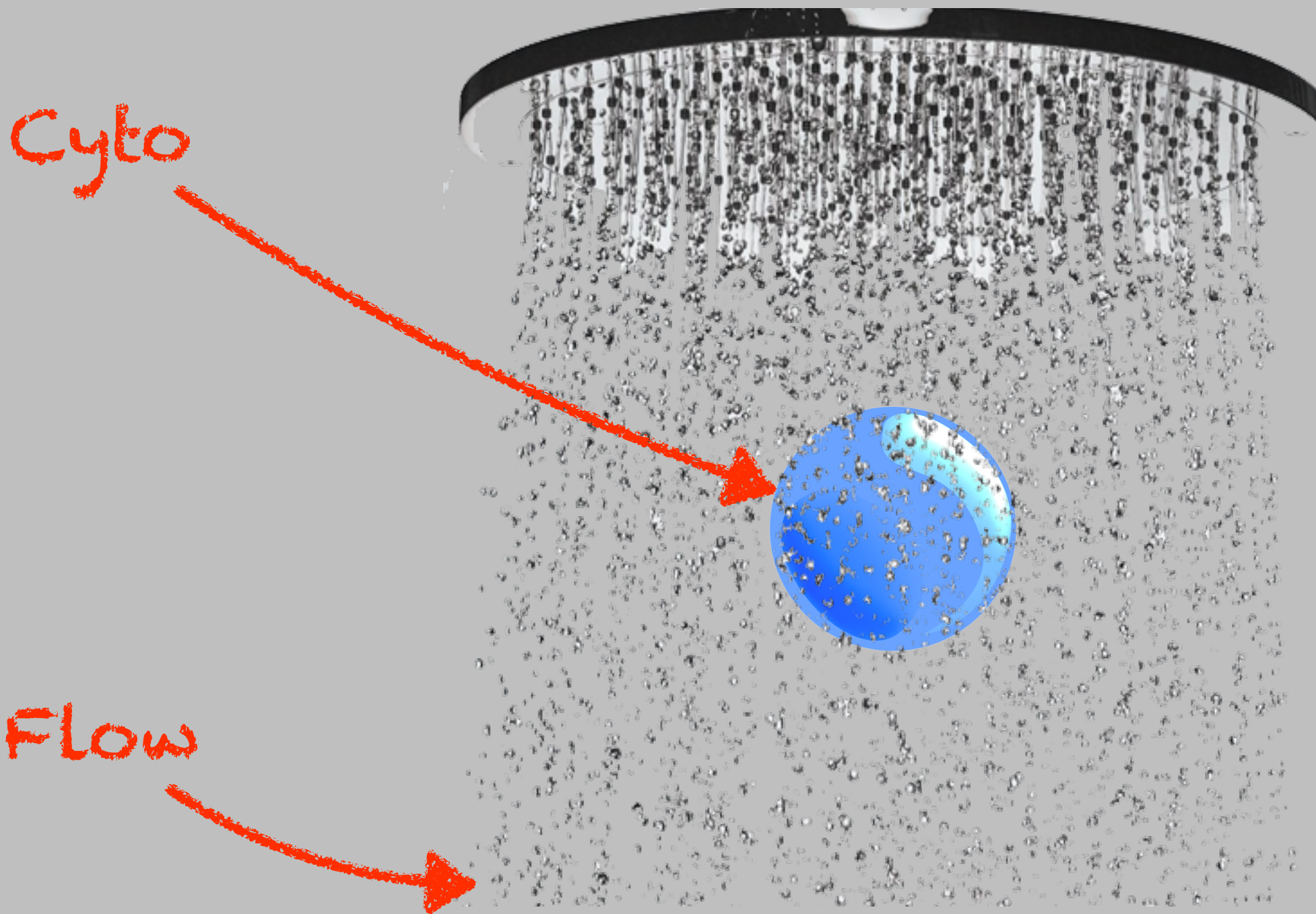
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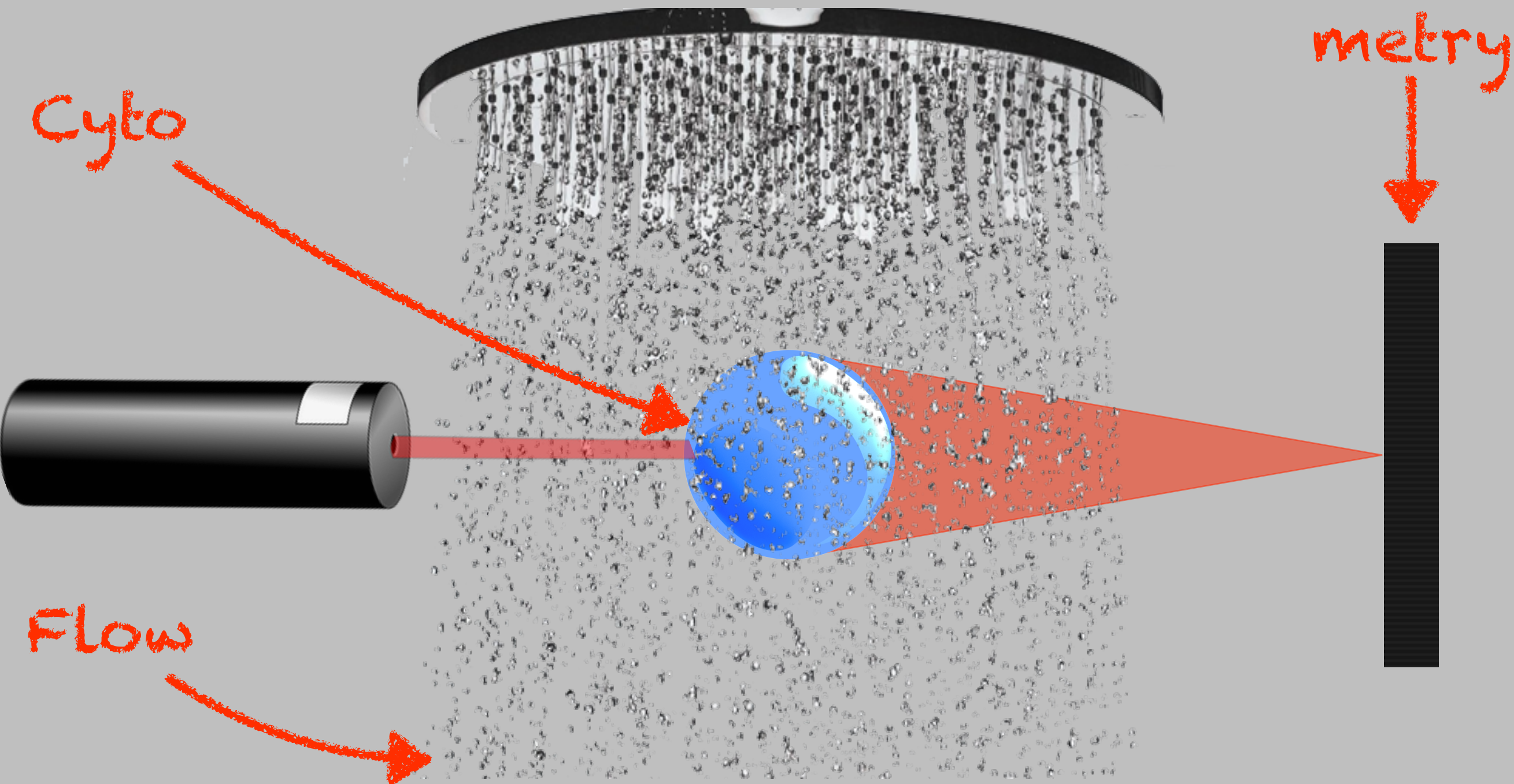
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What is flow cytometry?



What is flow cytometry?



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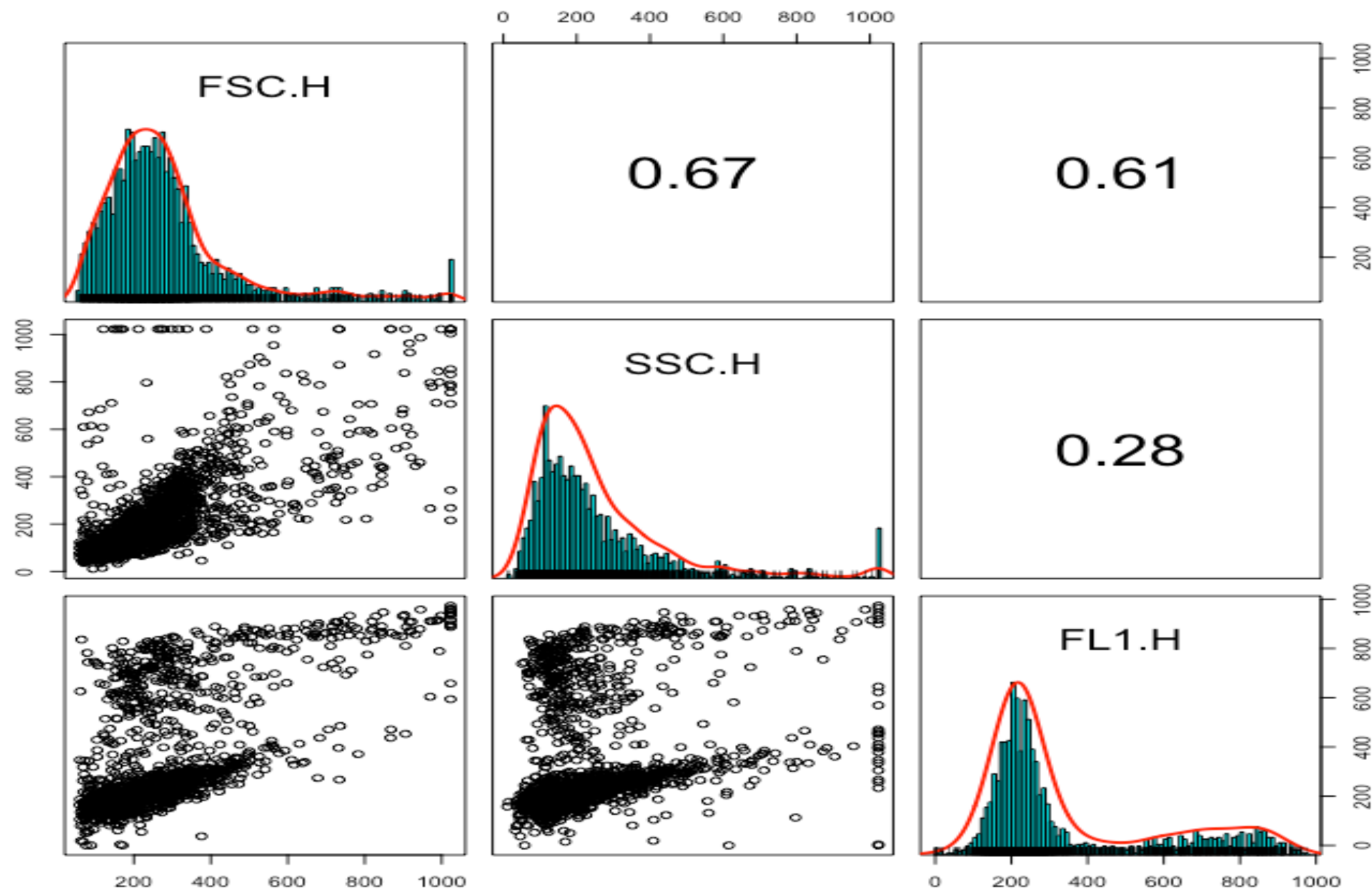
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Flow cytometry data...

	Mean	St. Dev.	Min	Max
FSC.H	287.08	178.19	59	1,023
SSC.H	251.83	186.65	11	1,023
FL1.H	349.16	234.35	0	974
FL2.H	126.40	90.84	0	705
FL3.H	258.34	192.26	1	1,023
FL1.A	73.46	195.15	0	1,023
FL1.W	17.60	56.39	0	444

Flow cytometry data...



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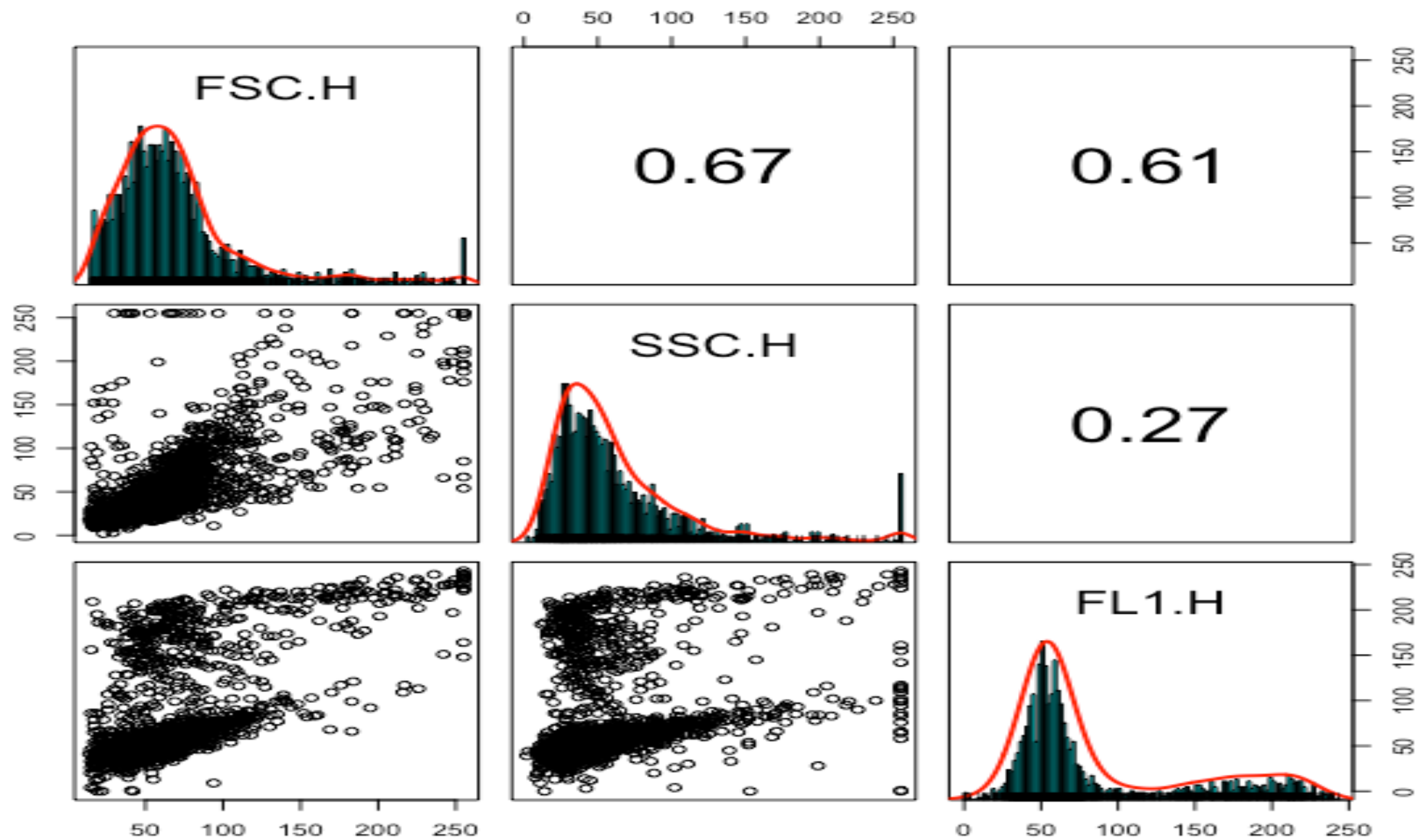


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Sparsity...

Statistic	N	Mean	St. Dev.	Min	Max
FSC.H	1, 545	71.40	44.53	14	255
SSC.H	1, 545	62.57	46.65	2	255
FL1.H	1, 545	86.93	58.58	0	243
FL2.H	1, 545	31.27	22.66	0	176
FL3.H	1, 545	64.20	48.03	0	255
FL1.A	1, 545	18.25	48.65	0	255
FL1.W	1, 545	4.33	14.01	0	111
time	1, 545	294.04	177.55	2	598

Sparsity...



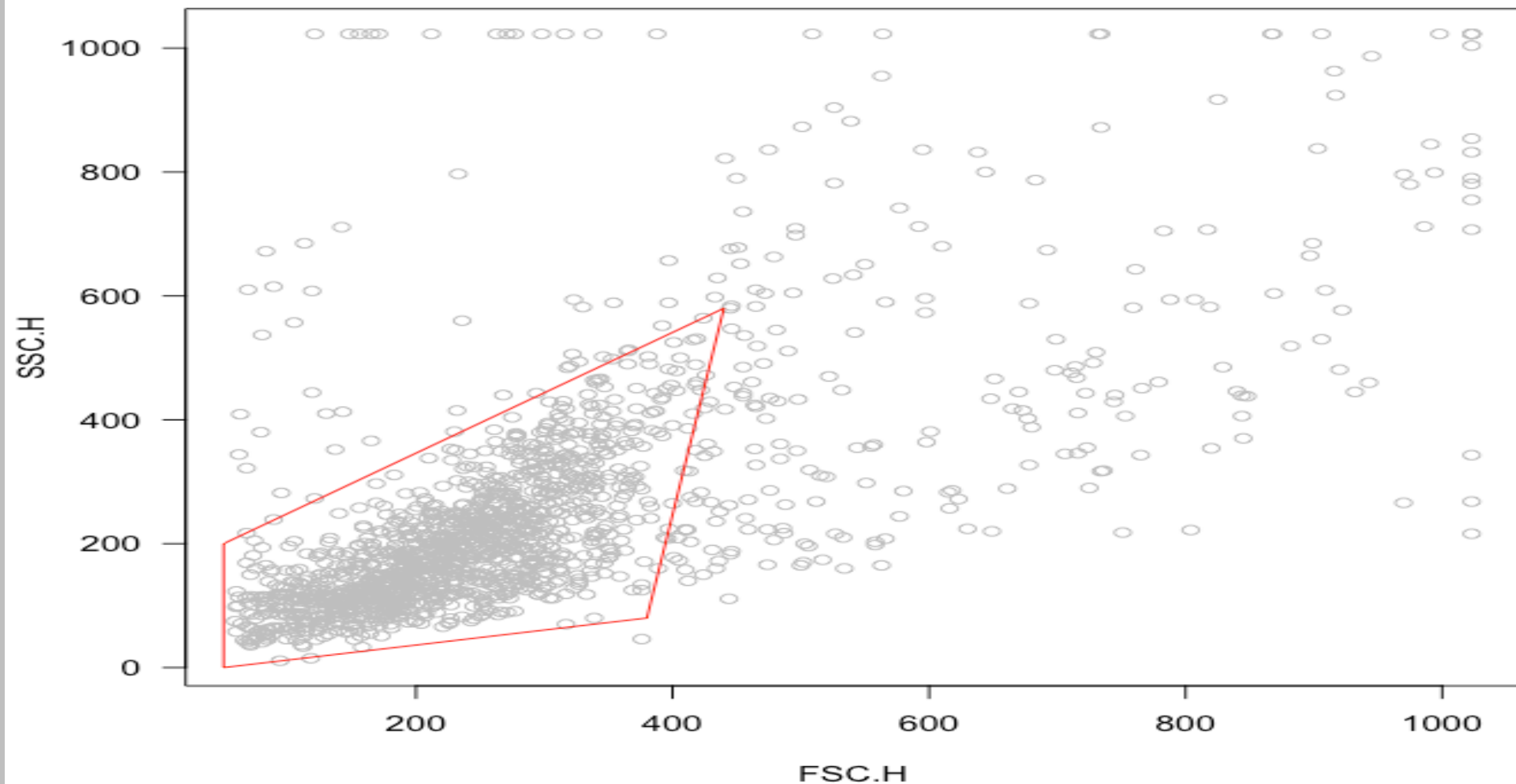
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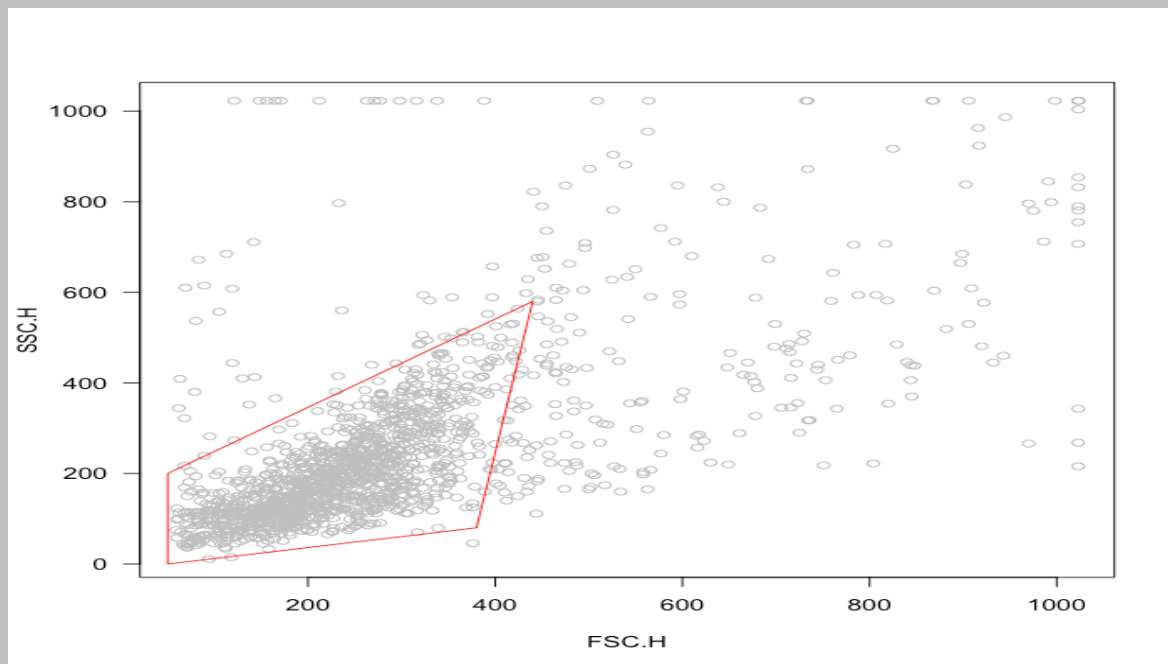
EXISTING METHODS...

Industry Standard...



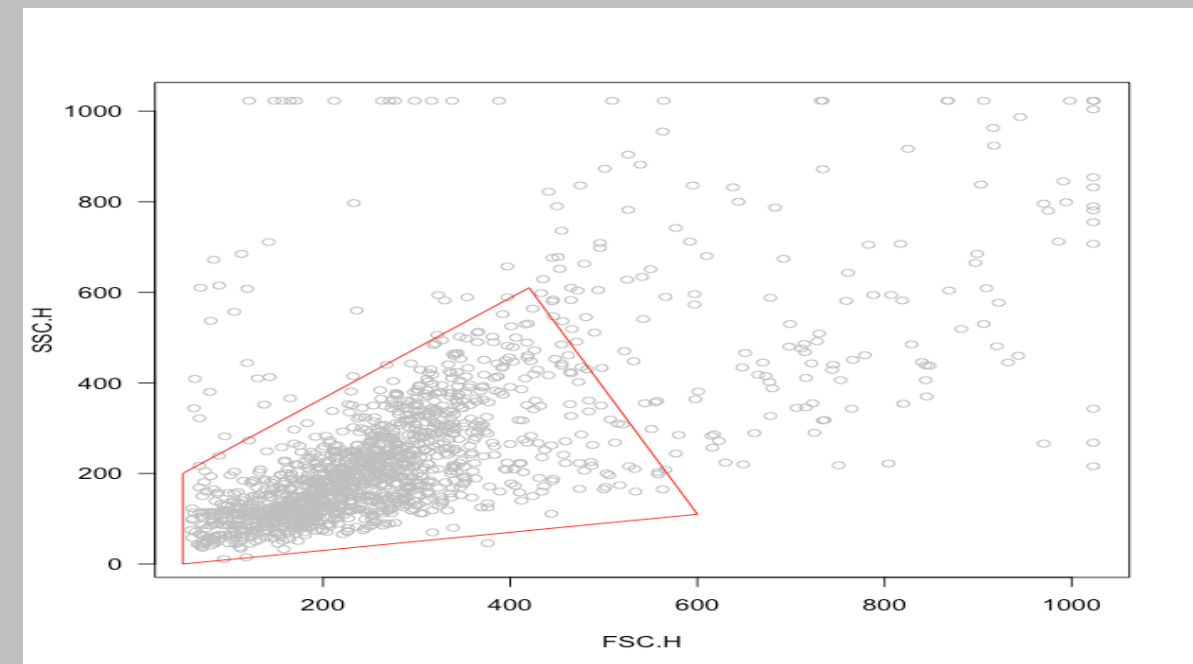
Industry Standard...

Expert 1



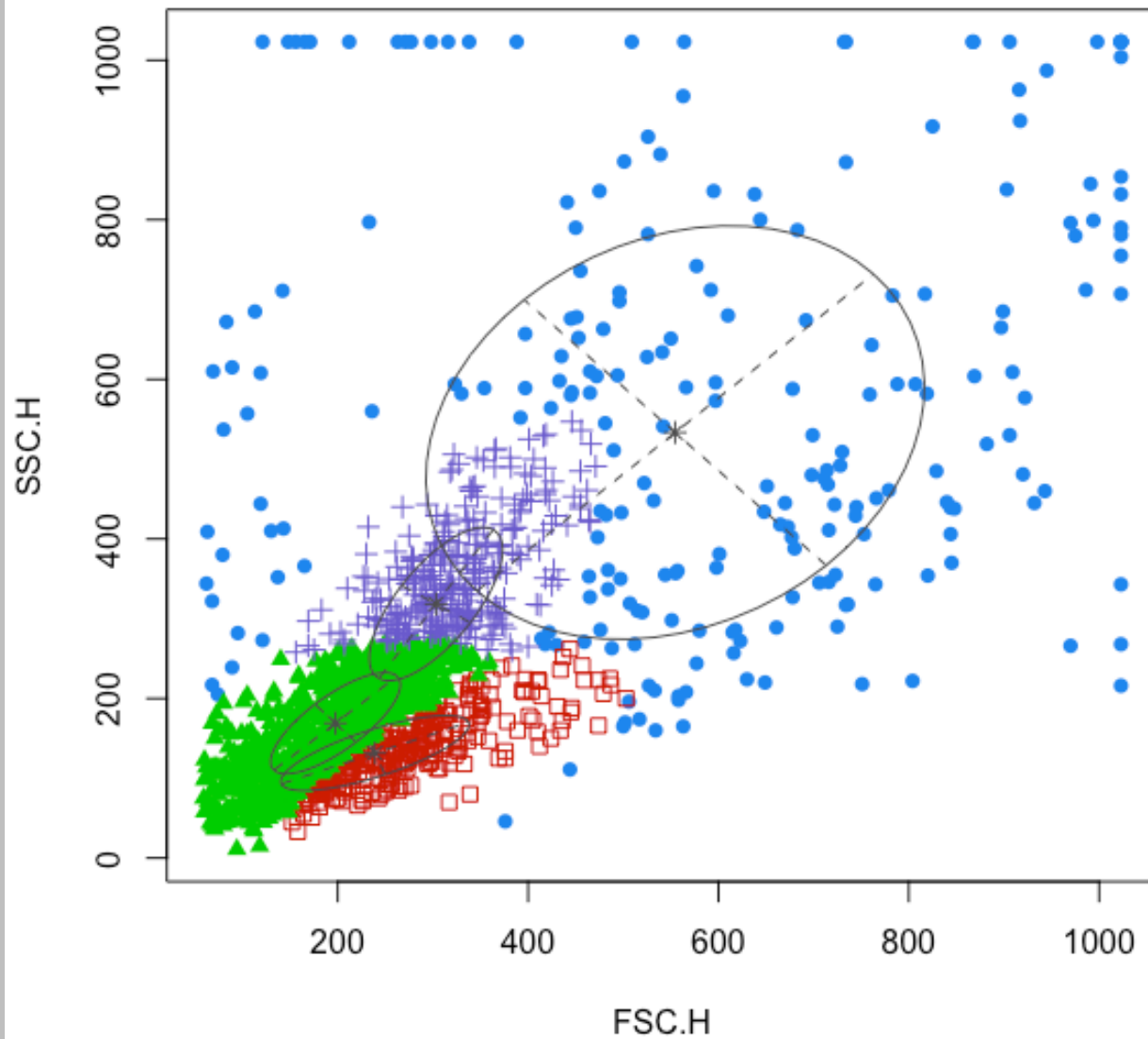
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Expert 2

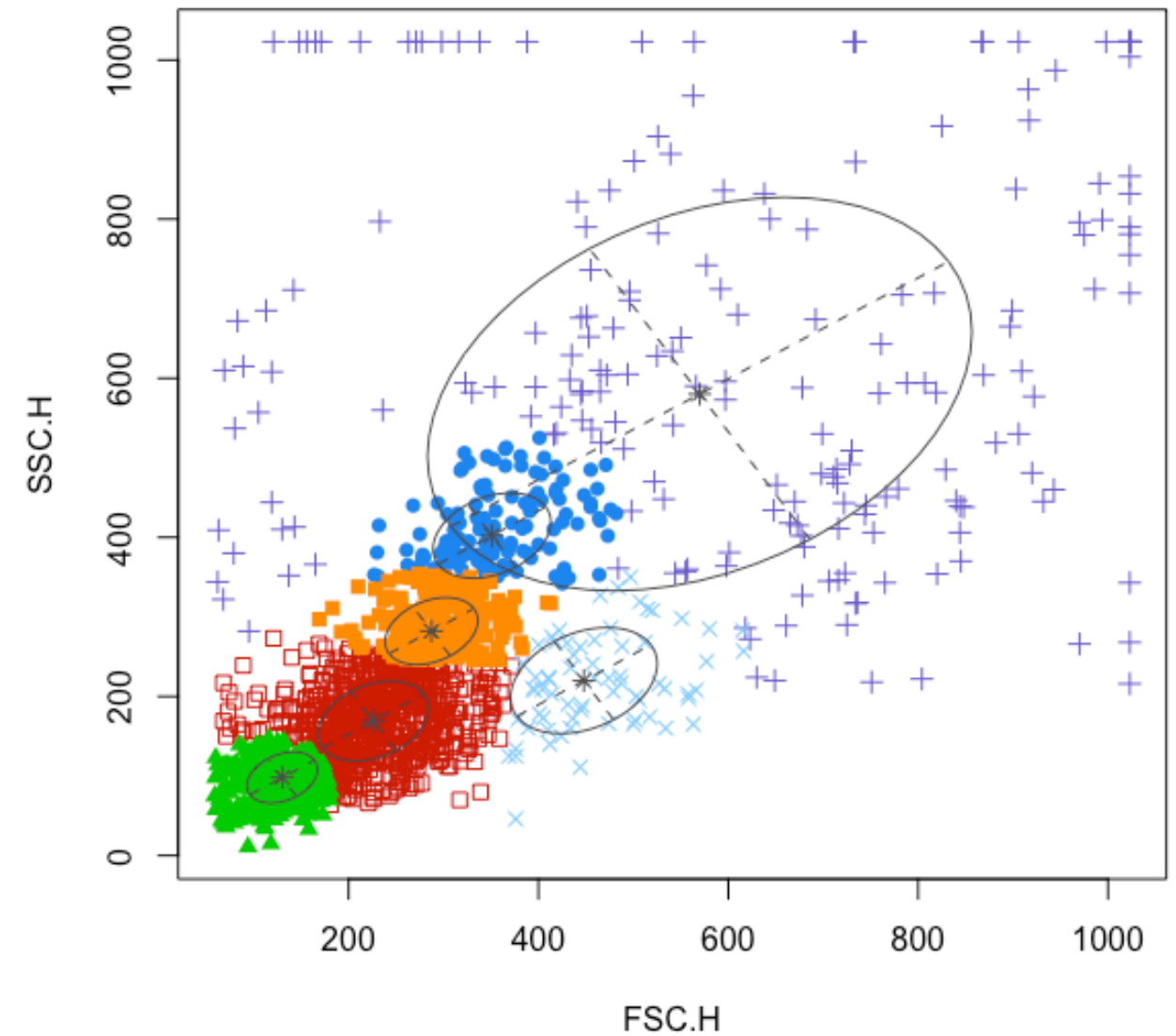


Model Based Clustering...

4 groups by mclust



6 groups by mclust



t-distribution Mixtures...

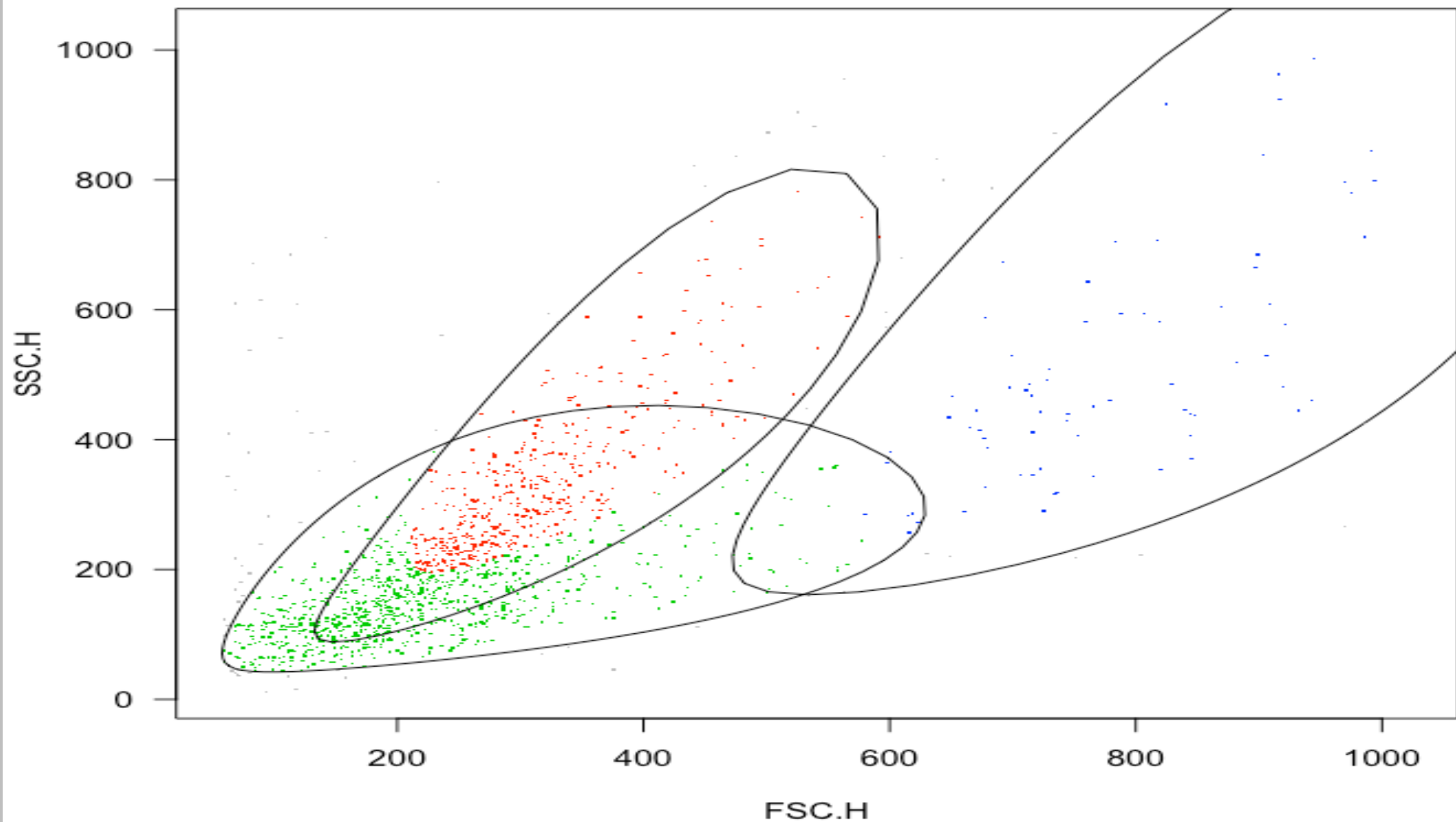
ORIGINAL ARTICLE



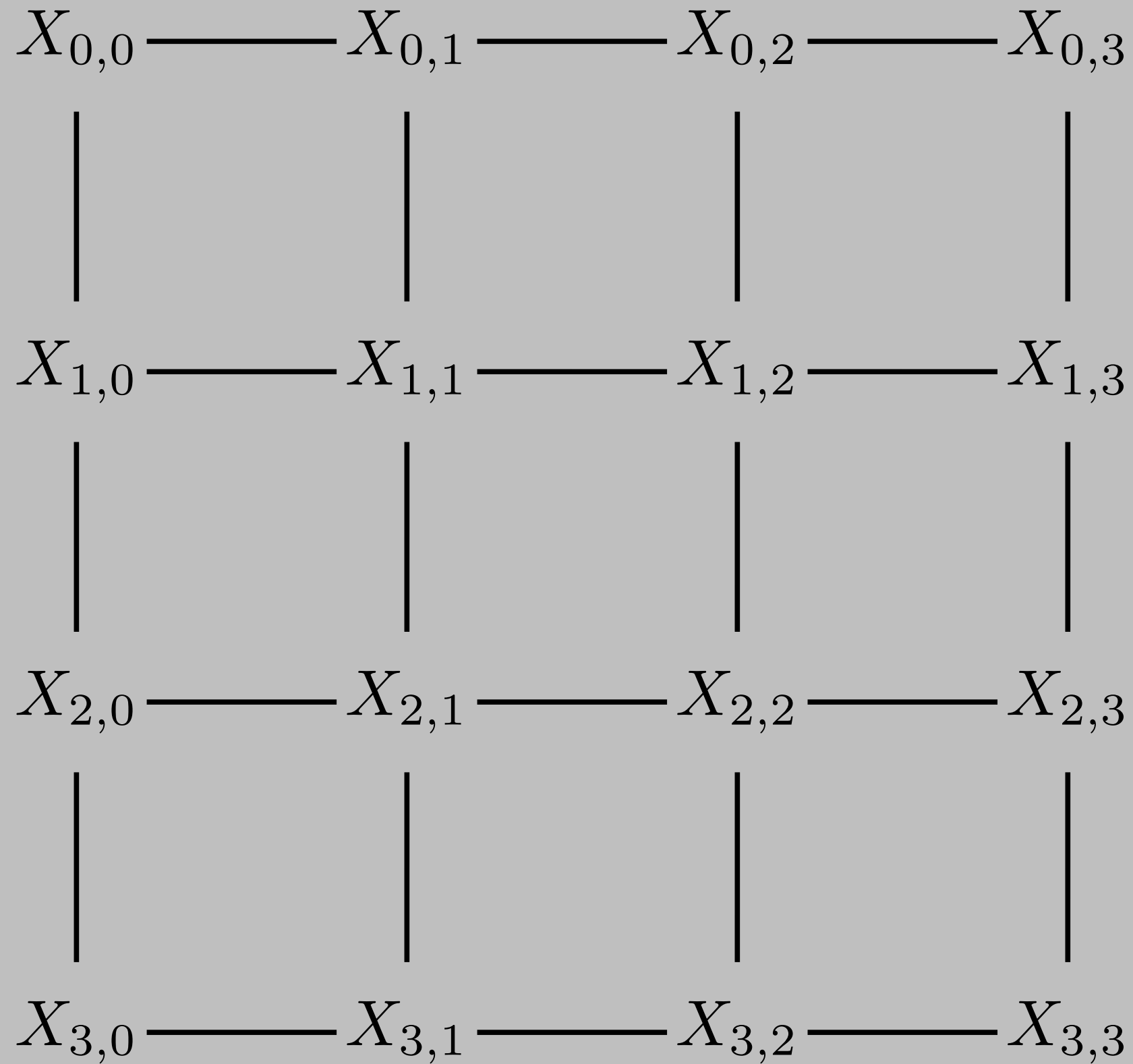
Automated Gating of Flow Cytometry Data via Robust Model-Based Clustering

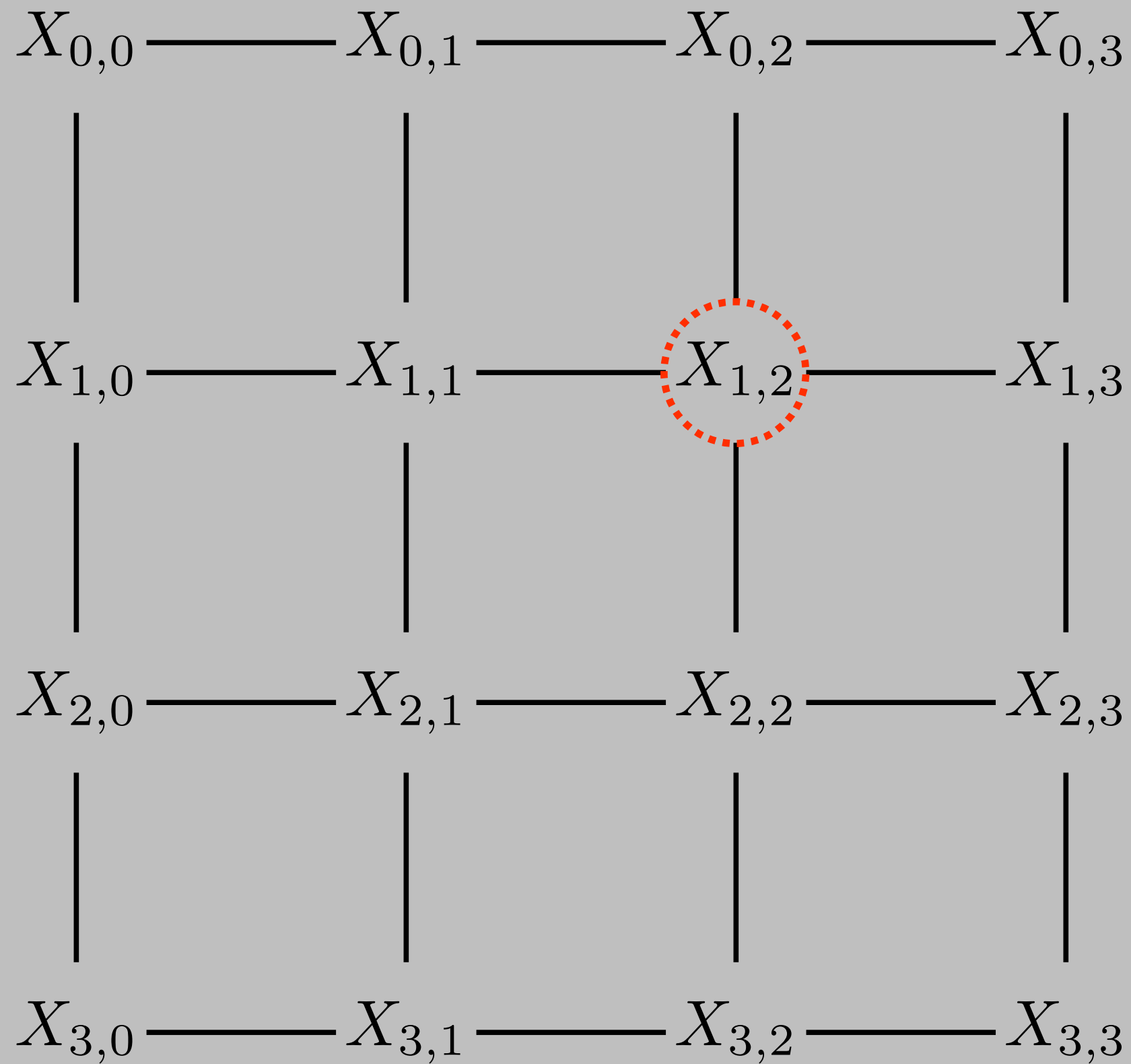
Kenneth Lo,^{1*} Ryan Remy Brinkman,² Raphael Gottardo¹

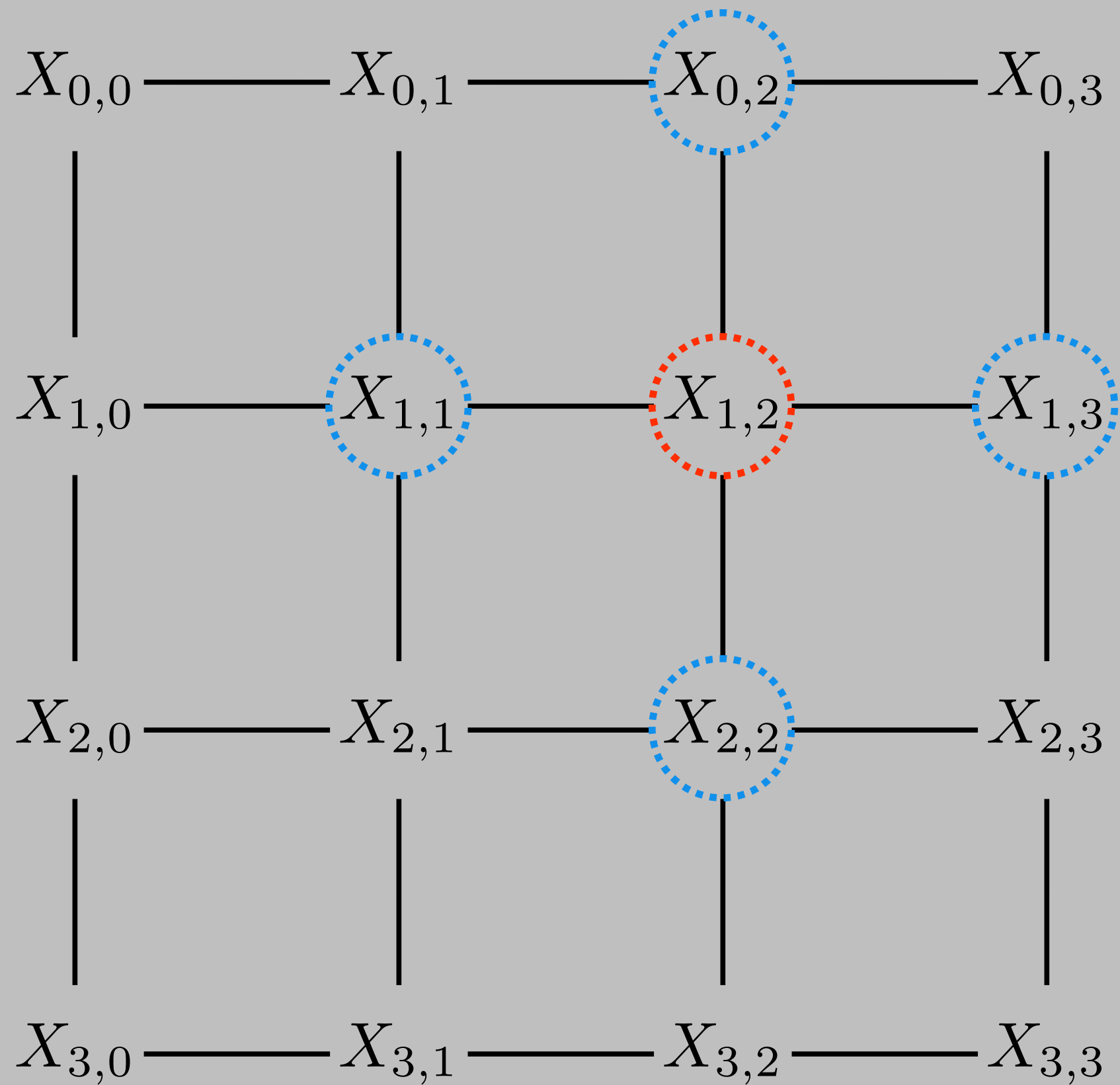
t-distribution Mixtures...

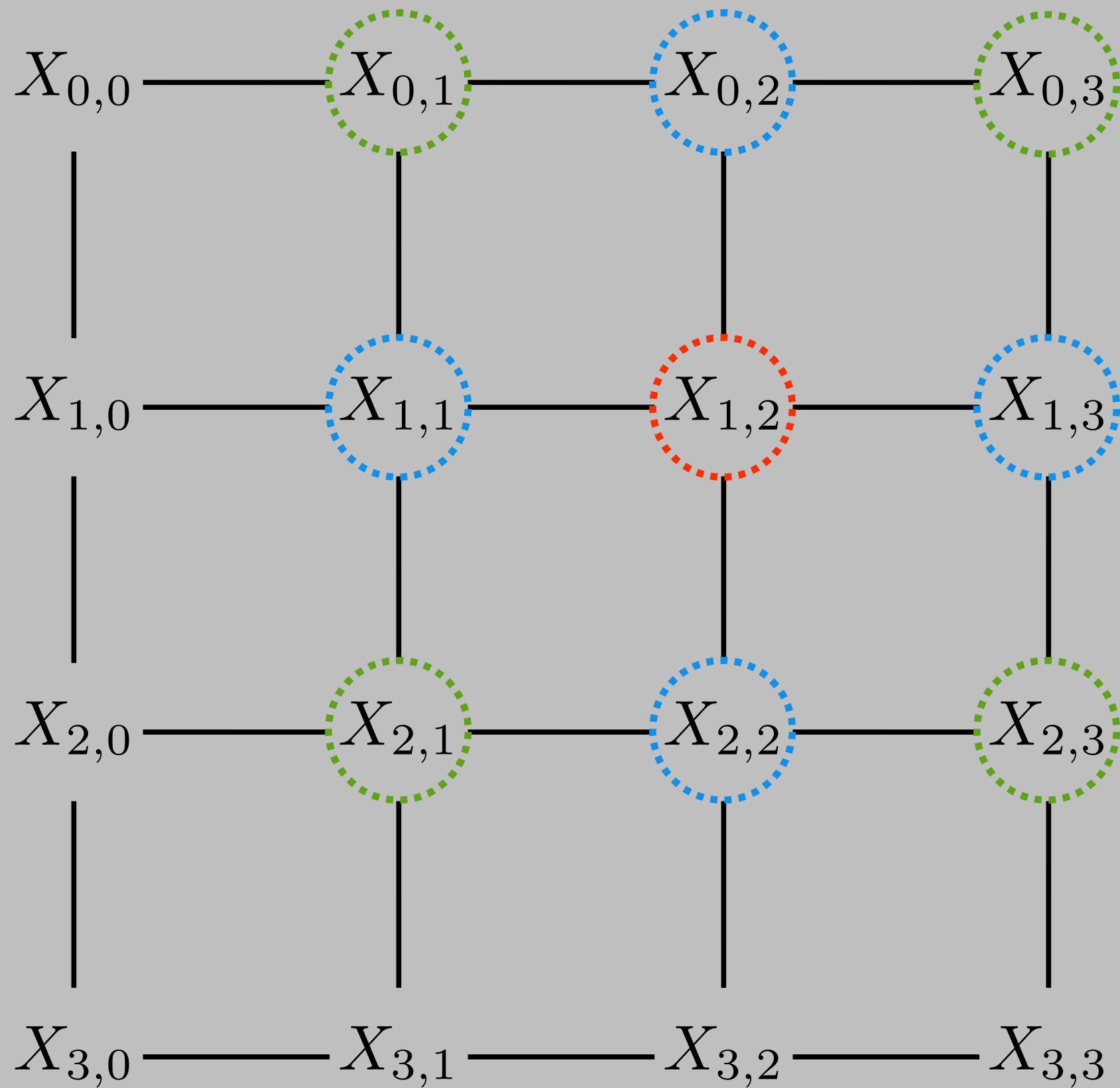


MARKOV RANDOM FIELDS...



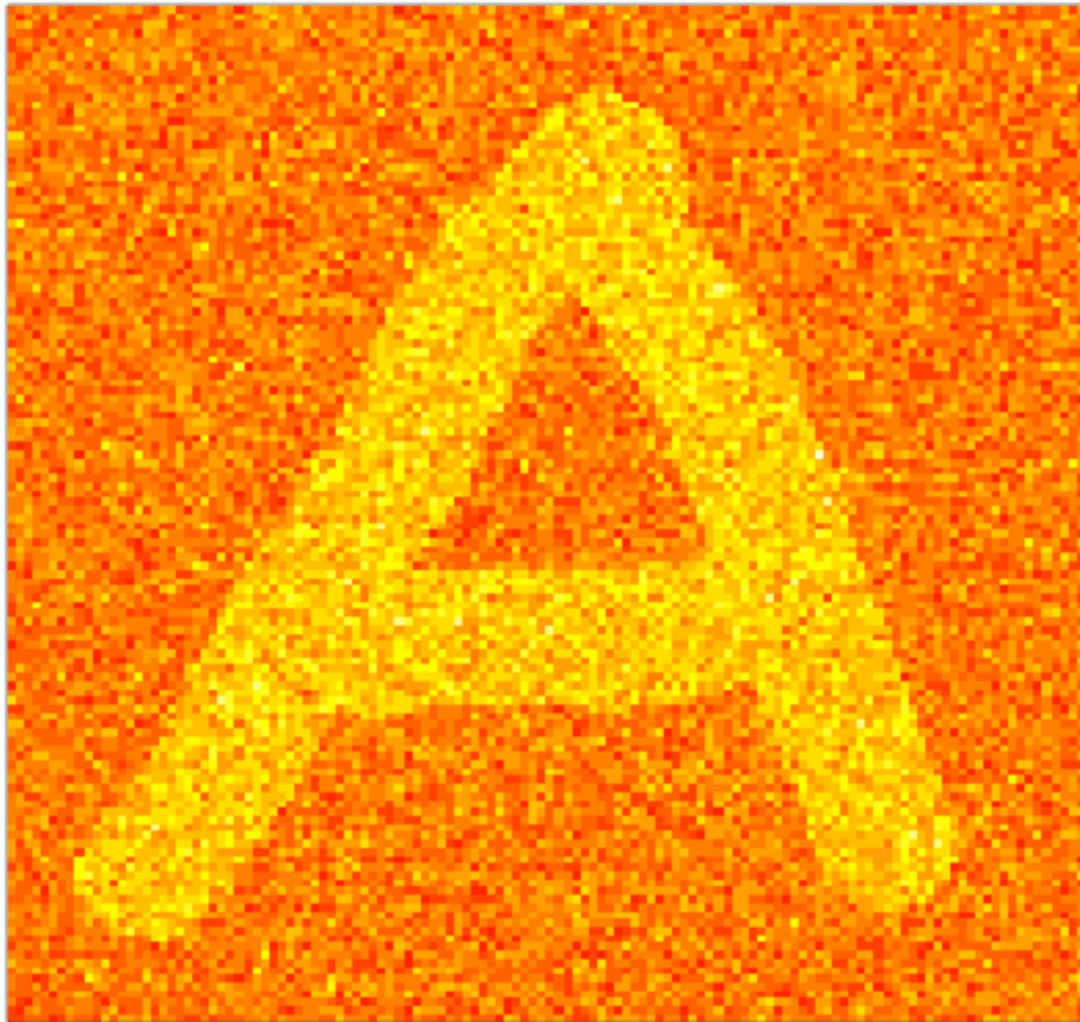




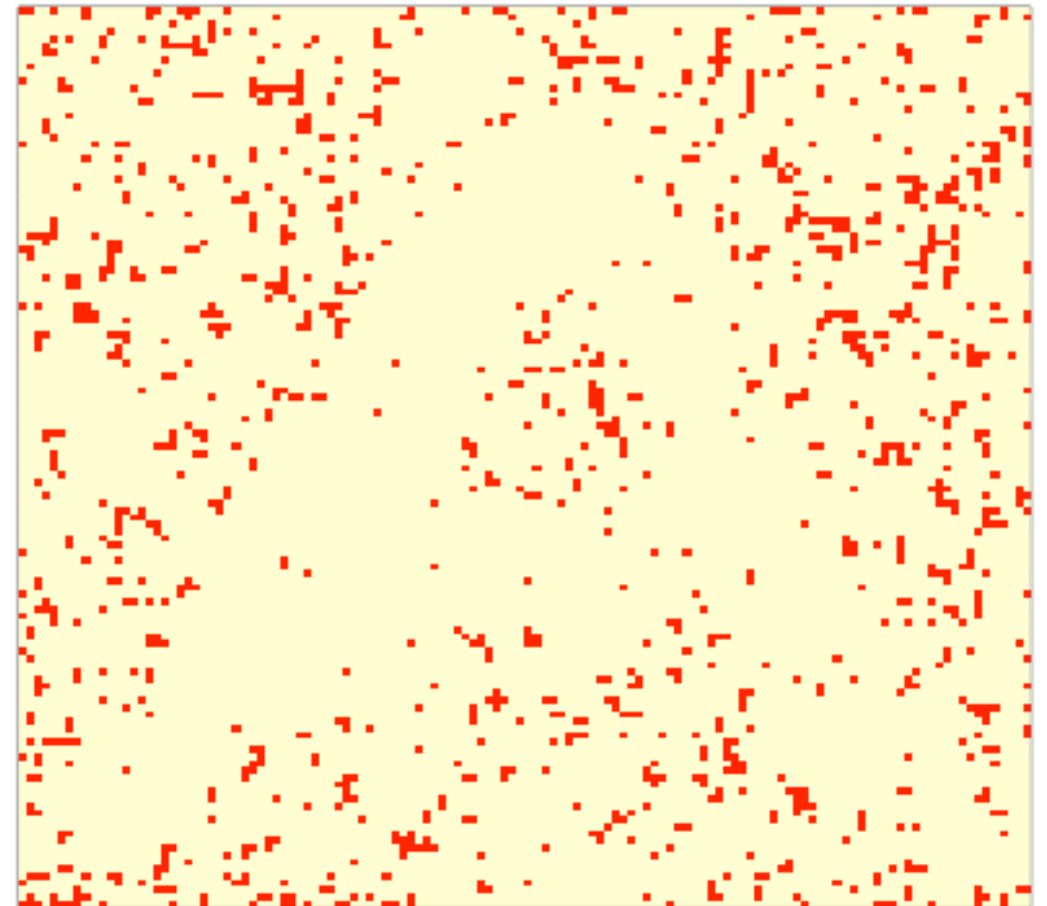


Working Example...

Noisy Image

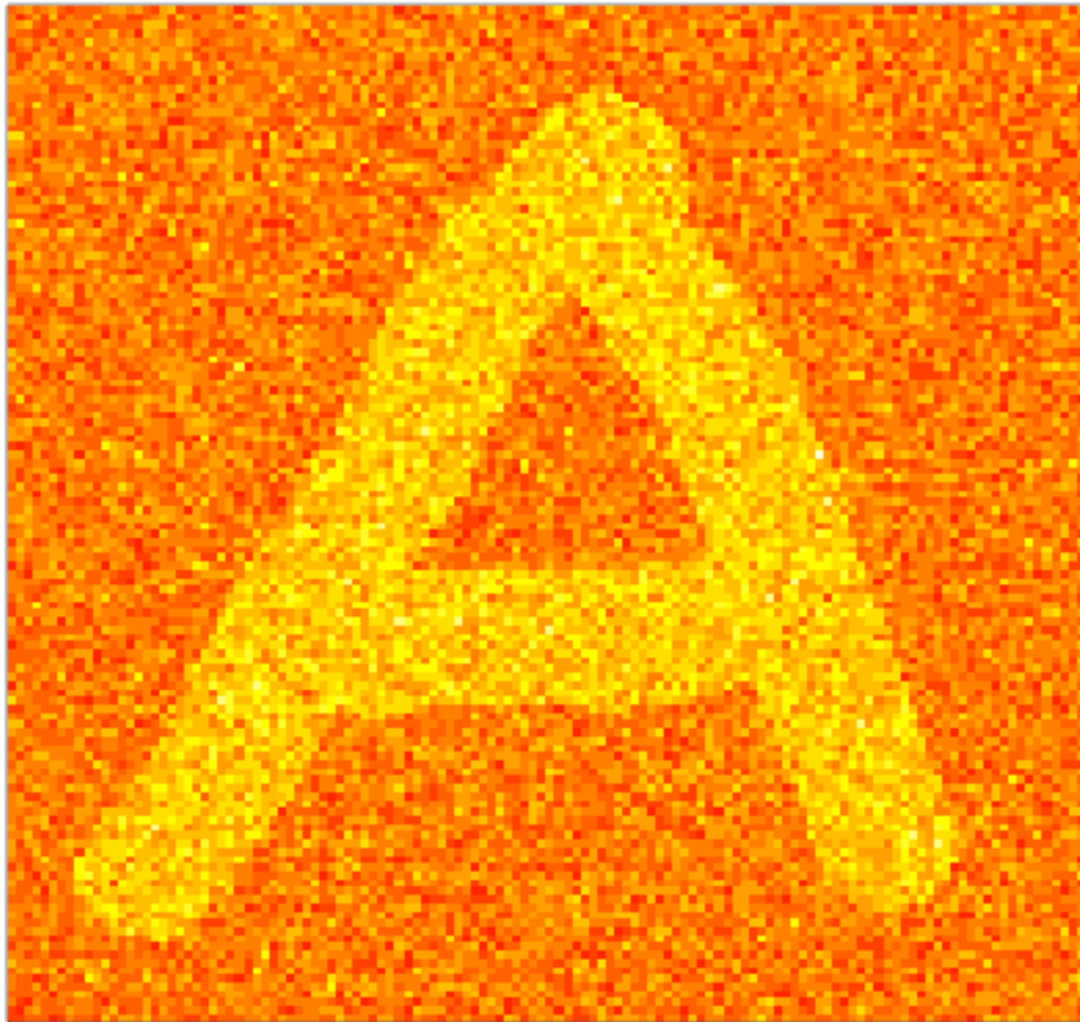


Iteration 10001

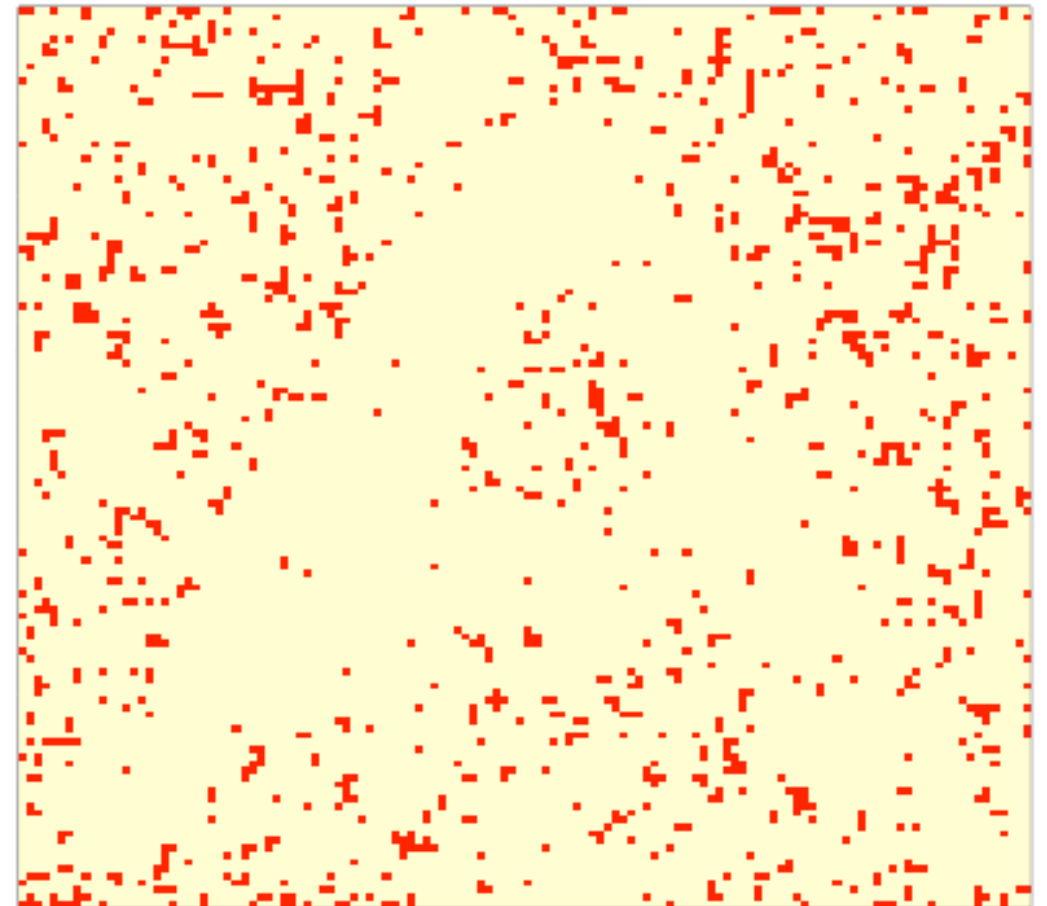


Working Example...

Noisy Image



Iteration 10001



IDENTIFYING CLUSTERS...

Connected-Components...

Connected Component Labeling Two-Pass Algorithm Demo

Author: www.icvpr.com

Connected-Components...

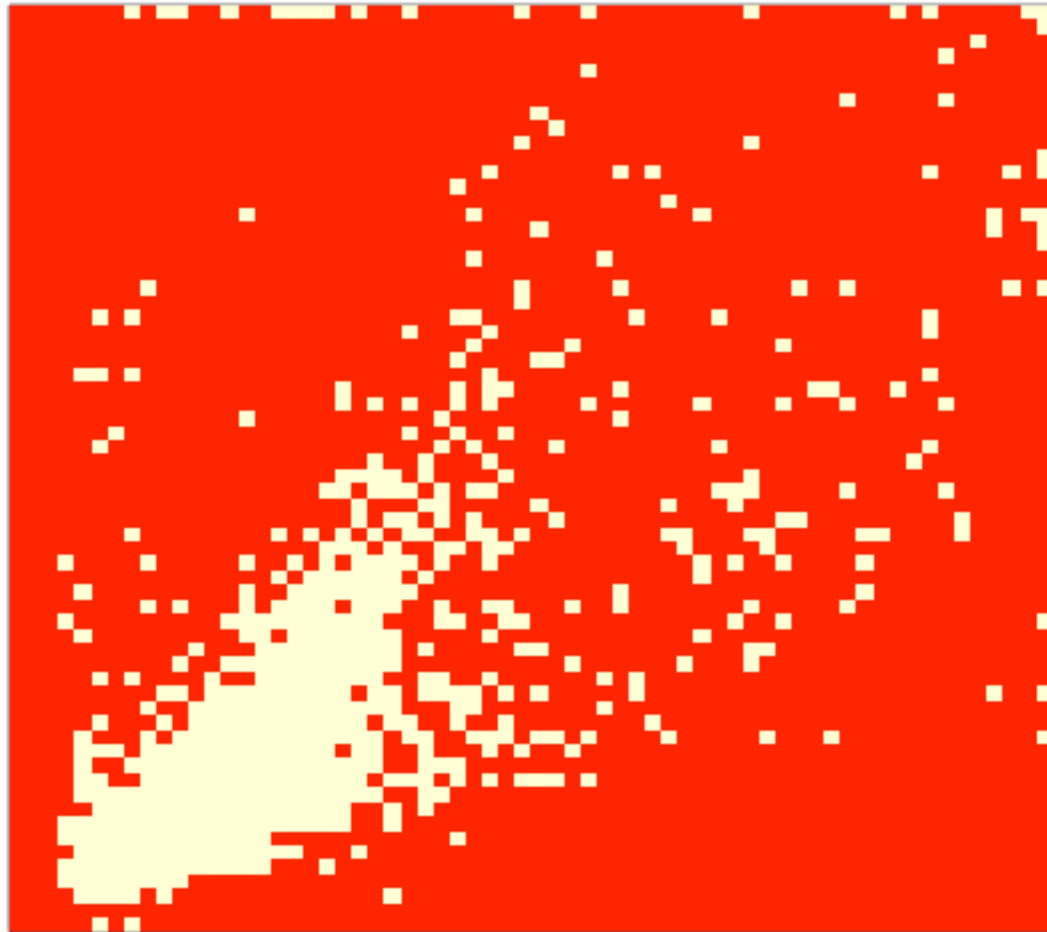
Connected Component Labeling Two-Pass Algorithm Demo

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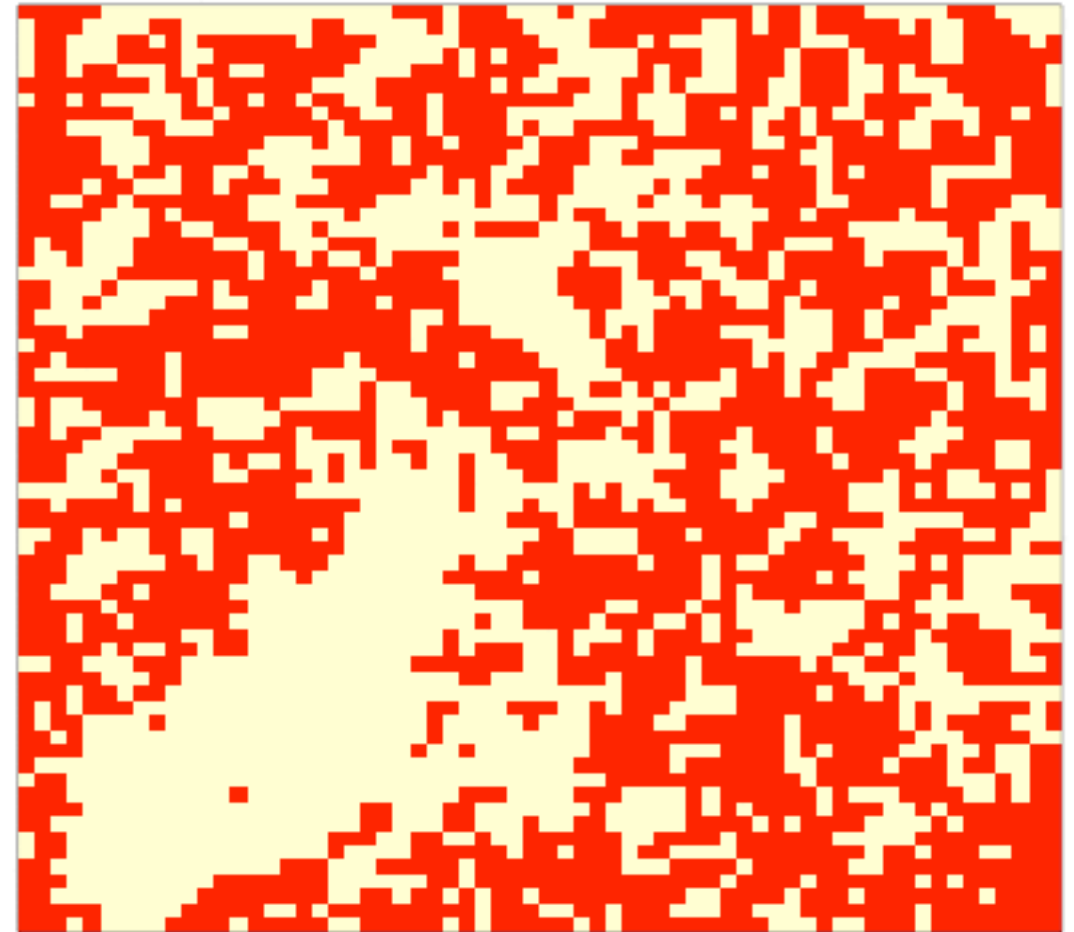
RESULTS...

6-bit configuration...

Original 6-bit

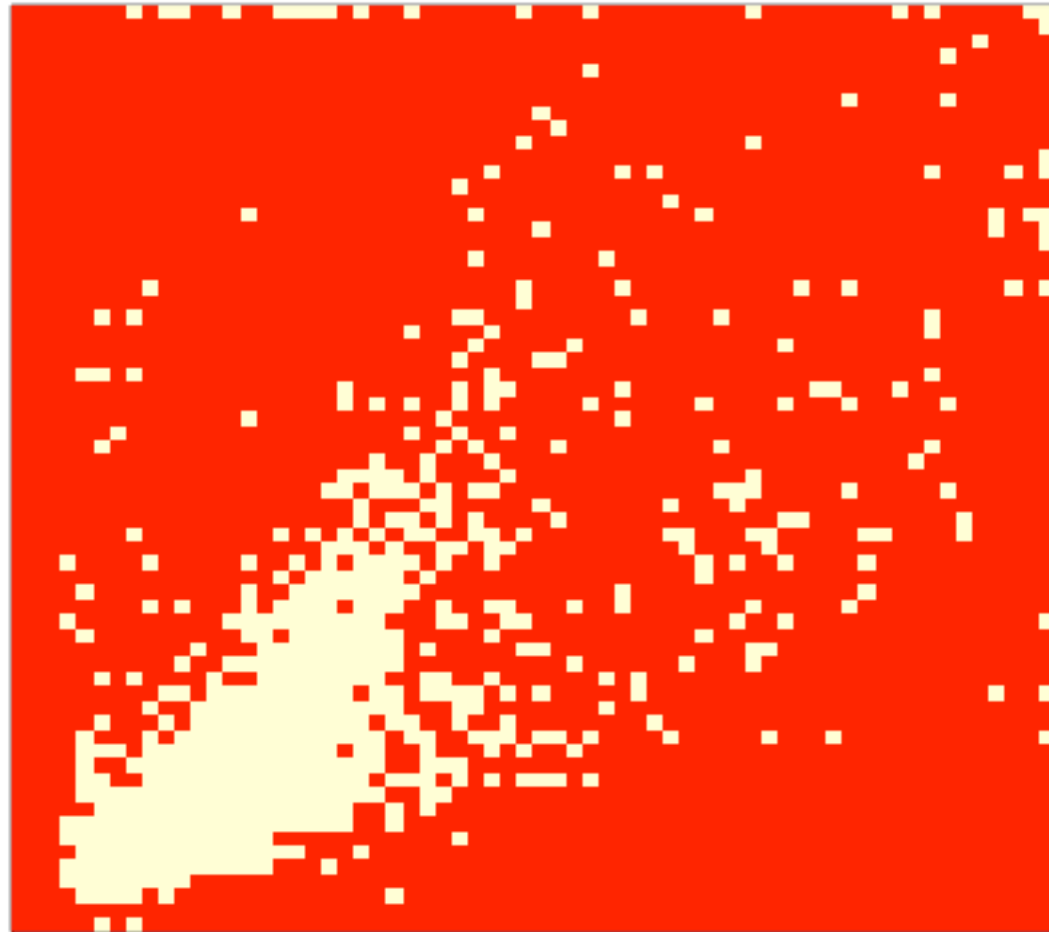


Iteration 10001

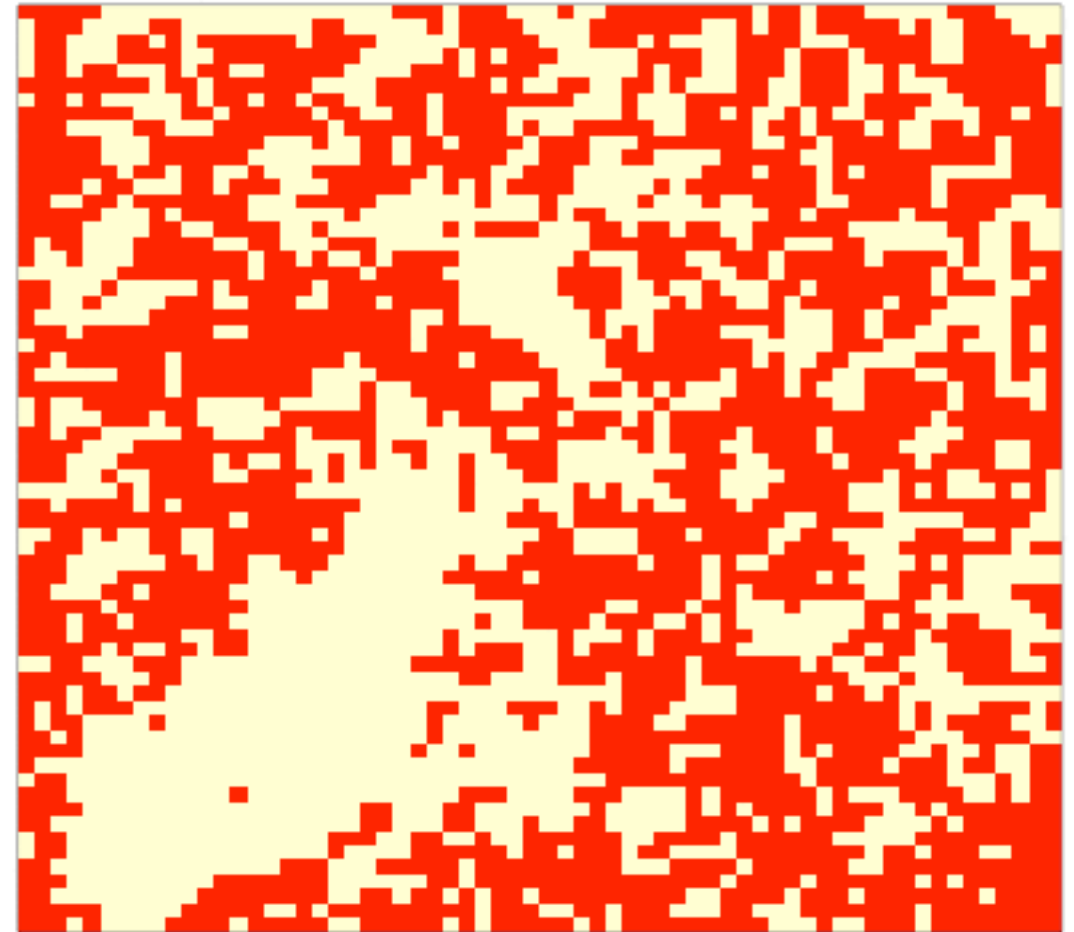


6-bit configuration...

Original 6-bit

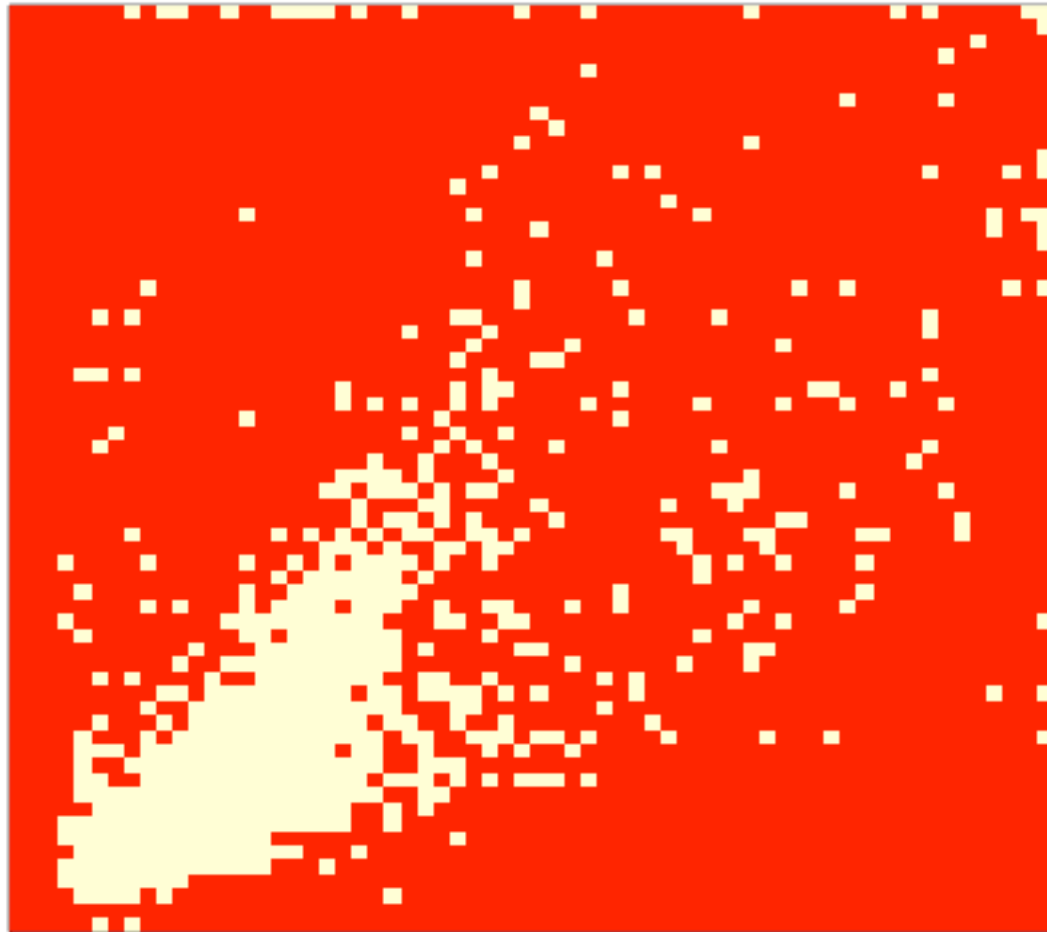


Iteration 10001



6-bit configuration...

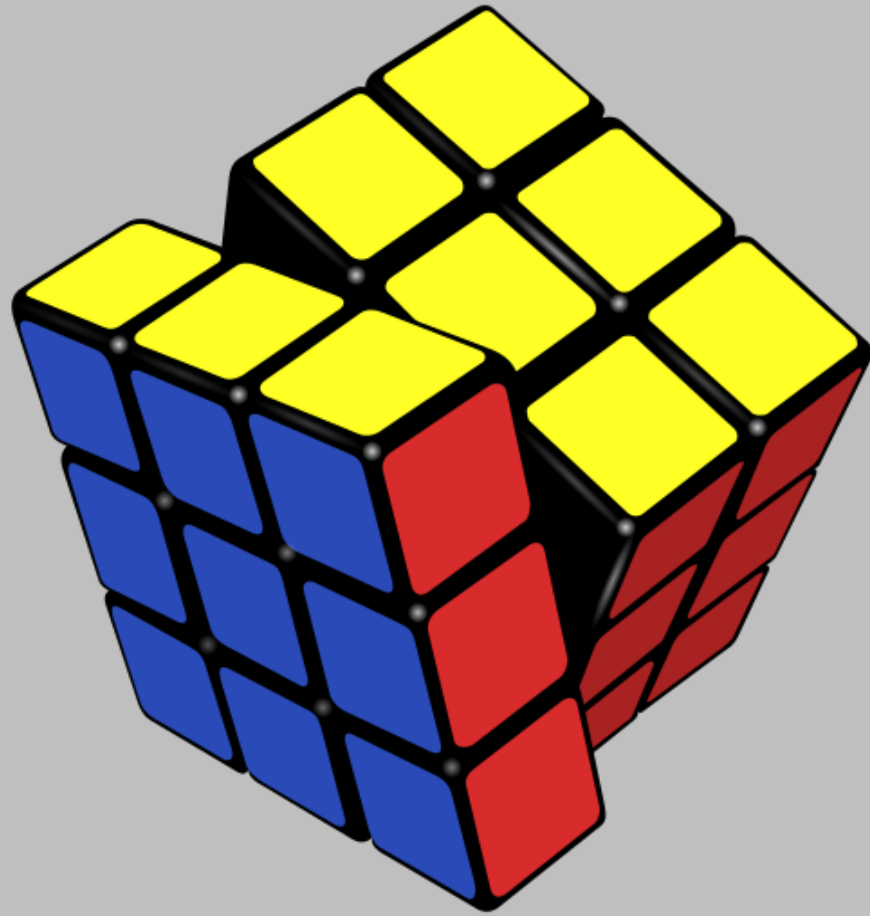
Original 6-bit

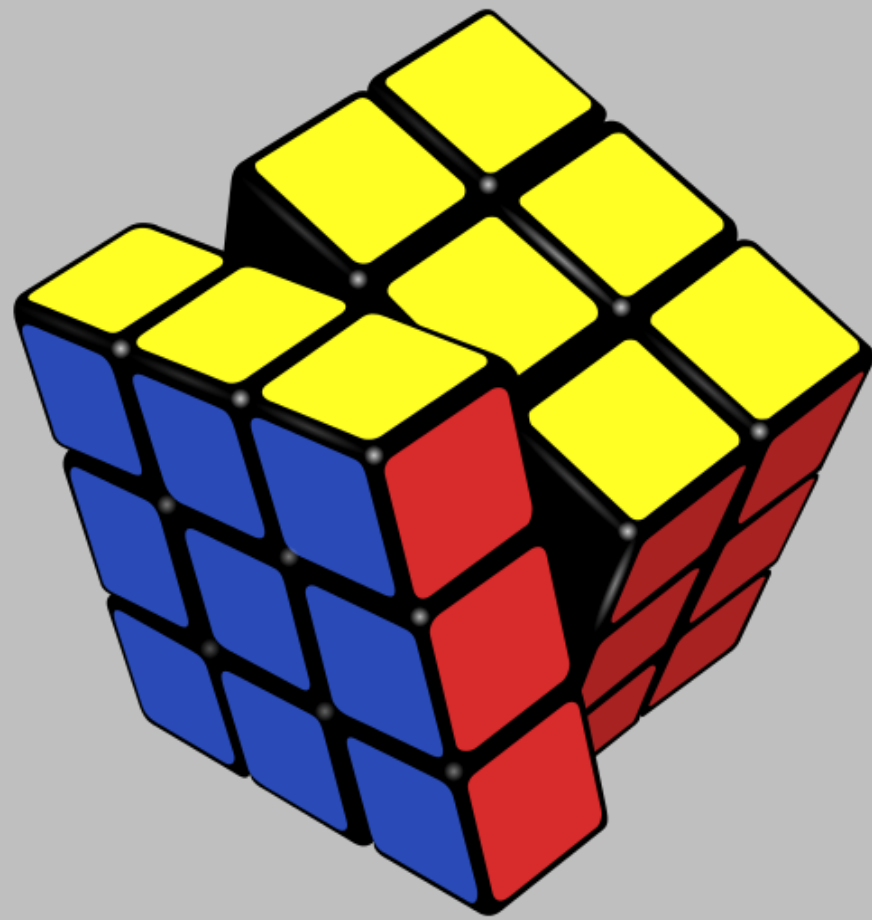


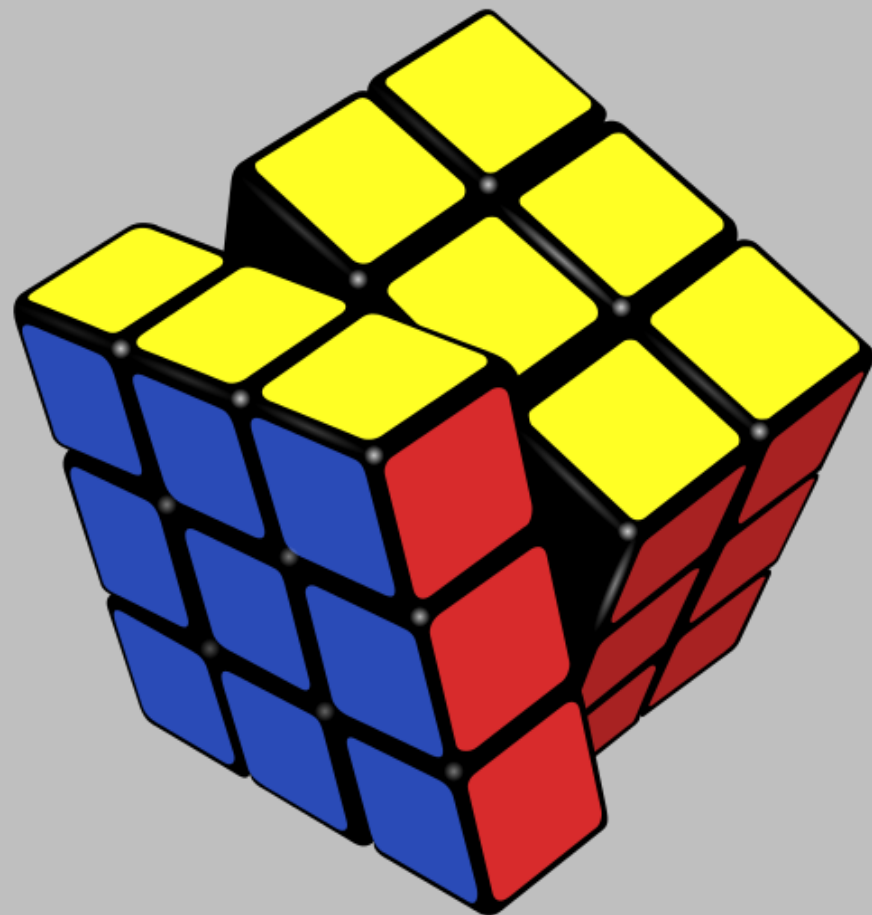
Clustered 6-bit

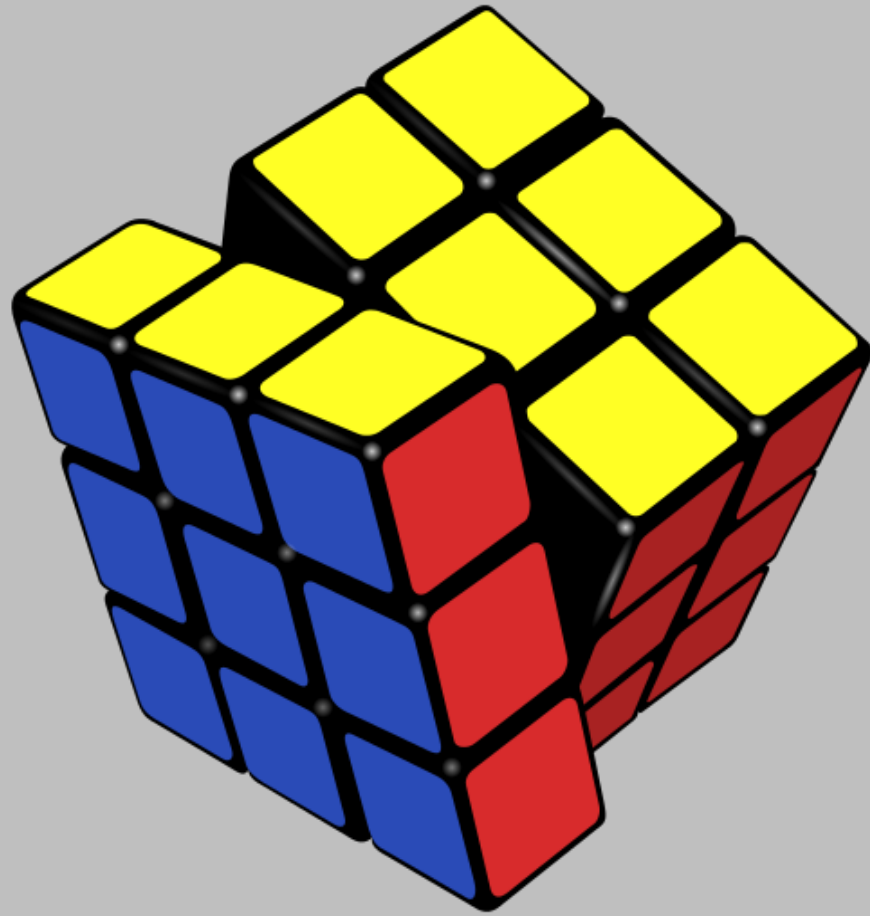


FURTHER WORK...









THANKS FOR LISTENING!
ANY QUESTIONS?

