

DSGRN Group Meeting Presentation 5

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Parameter Space Decomposition

Recall Goal: Evaluate $f = z_1 + \cdots + z_n$ (n variables), where each z_i can evaluate to $\ell_i, \ell_i + \delta_i^{(1)}, \dots, \ell_i + \cdots + \delta_i^{(m-1)}$ (m choices) and all $\ell, \delta > 0$. What are the possible orders for these evaluated polynomials?

My code was able to run on my computer to calculate these cases:

$(n = 2, m = 2)$: 2 total orders (instant)

$(n = 3, m = 2)$: 12 total orders (instant)

$(n = 4, m = 2)$: 336 total orders (~ 90 seconds)

$(n = 2, m = 3)$: 36 total orders (instant)

$(n = 2, m = 4)$: 6660 total orders (~ 5 minutes)

Each of $(n = 3, m = 3)$ and $(n = 2, m = 5)$ cases didn't finish after 8 hours.

Next step: Run my code distributively on a server to calculate some of the harder cases.

Incorporating into DSGRN

I took my polynomial orders and calculated the possible binning representations when threshold placeholders are added.

Binning representation: The i th element is how many thresholds are activated when we have input i .

E.g. Say we have $p_0 < p_2 < p_1 < p_3$.

Then two thresholds can be placed in: $p_0 < \theta_1 < p_2 < \theta_2 < p_1 < p_3$.

This results in the binning representation $(0, 2, 1, 2)$ since the input corresponding to 0 activates 0 thresholds, input of 2 activates 1 thresholds, and 1 and 3 activates 2 thresholds.

I calculated the binning representations with up to 6 thresholds.

Next step: Write code so that DSGRN can handle multiple thresholds using what I've calculated so far (hopefully with minimal modification).