Why Pay the Tropical Tax?

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Abstract

If the recent ablation claims are right, tropical max-min costs roughly three bits per character relative to softer combination rules. That is a serious empirical tax. But it does not follow that paying the tax is irrational. If the goal is to study the Universal Model as a mathematical object rather than merely to minimize compressed size, then the tax may be the price of exact algebraic tractability. This note states the strongest version of that case.

1 The Temptation

Once a cheaper scoring rule appears, the natural reaction is:

why keep the expensive one?

If the project were only a compression contest, that question would end the discussion. But the project is not only a compression contest. It is also an attempt to understand a specific object: count-based prediction with explicit event spaces, explicit pattern structure, and an exact forward rule.

2 What The Tax Buys

Proposition 1. *The exact rigid max-min rule buys exact structure that is unusually clean:*

1. a lattice-theoretic forward pass;
2. a direct count-to-support semantics;
3. an exact quotient/luck interpretation;
4. clean fixed-point and monotonicity questions;
5. a compact mathematical spine for the MCP.

These are not aesthetic extras. They are reasons the system is understandable as a mathematical object rather than as a bag of useful heuristics.

3 Why This Still Matters

Remark 1. *A worse compressor can still be a better scientific object.*

There are many domains where the right object of study is not the numerically best performer. Exact arithmetic, reversible computing, finite-state models, and idealized physical systems all survive because they reveal structure that would be obscured in a more performant but less rigid formulation.

The UM may be in that category. If so, the right comparison is not:

> does the exact rigid max-min object buy enough understanding to justify keeping it even if richer tropical or non-tropical rules compress better?

but:

> what can be proved, factored, and understood exactly under max-min that becomes opaque under the softer rule?

4 The Price Must Be Faced Honestly

None of this works if the tax is hidden.

Proposition 2. *The only intellectually serious pro-UM position after the ablation is an honest one: the algebra is valuable enough that we are willing to pay for it.*

That means:

- no pretending that source selection alone closes the gap;
- no pretending that max-min is competitive if it is not;
- no pretending that Track U and Track C are the same project.

5 What A Rational Two-Track Project Looks Like

Once the tax is admitted, the division of labor becomes clearer:

1. Track C minimizes total bytes and adopts whatever combination rule wins.
2. Track U studies the exact max-min object and develops its theory.
3. Results can move between the tracks only with explicit relabeling.

Remark 2. *This is not a defeat for the UM. It is a refusal to confuse theoretical value with benchmark value.*

6 Conclusion

The tropical tax is only irrational if compression is the only thing we care about. If the goal also includes exact understanding of a rigid count-based predictive system, then paying the tax may be justified.

The burden is then clear: Track U must produce theorems, explanations, and structure commensurate with the price it asks us to pay. If it does not, the tax is waste. If it does, the tax is the cost of having an object worth understanding exactly.

References

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