Scalar Descent and Fracture Analysis in P3 Space

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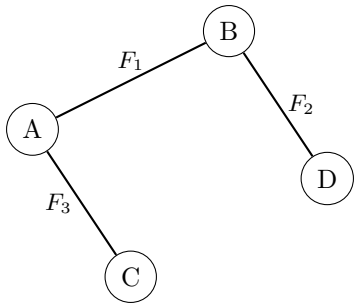
1 Scalar Descent Path with Fracture Persistence

The following table represents a descent path in P3 space, with fracture annotations and persistence values:

Step	P3 Input	Reduction Outcome	Fracture ID	Birth T	Death T	Persistence
0	P_0	Canonical	—	—	—	—
1	$P_0 + \delta_1$	Slight misalignment	F_1	0.12	0.46	0.34
2	$P_0 + \delta_2$	Flip across fold B	F_2	0.28	0.36	0.08
3	$P_0 + \delta_3$	Stuck in corner	F_3	0.05	0.67	0.62

2 Simplicial Bin Network with Fracture Connections

Each vertex represents a scalar bin. Edges represent adjacency relations via reduction or fracture events. Edge labels denote fracture identifiers.



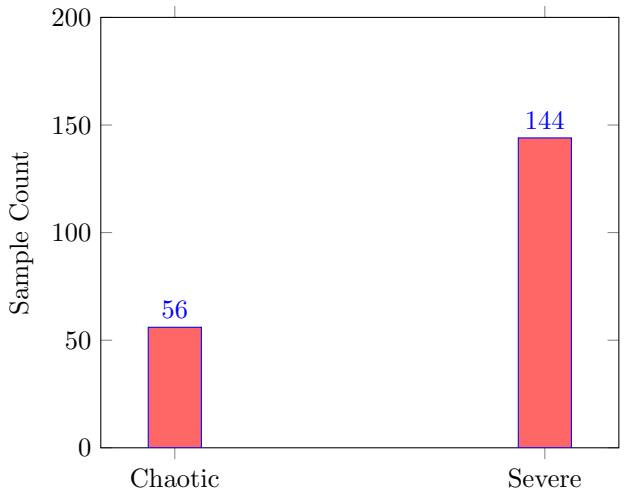
3 Bin Merging Protocol Based on Stability

This code snippet defines merge conditions based on fracture persistence and signature similarity.

```
bool shouldMerge(const ScalarBin& bin1, const ScalarBin& bin2,
    double persistence) {
        return (persistence < 0.1) &&
        (signatureDistance(bin1.signature, bin2.signature) < 0.05)
            &&
        (isPermutationInvariant(bin1, bin2));
}
```

Listing 1: Bin Merge Criteria Based on Scalar Stability

This helps define bin boundaries that reflect stable scalar neighborhoods in fold space.


200
150
100
50
0
Sample Count
144
56
Chaotic
Severe