⚠️ Curse of Dimensionality

High dimensions create counterintuitive geometric properties

Distance Concentration
All points become equidistant in high dimensions

Volume Concentration
Data occupies tiny fraction of space

Exponential Growth
Required samples grow exponentially with features

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Nearest Neighbors
Become meaningless

Visualization
Impossible beyond 3D

Computational Cost
Memory & time increase

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✓ Solution: Dimensionality Reduction
Preserve structure in lower dimensions while maintaining essential information and relationships