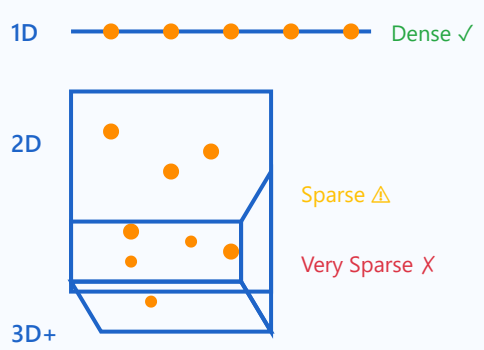
High Dimensionality

⚠ The Curse of Dimensionality

When features (P) greatly exceed samples (N): P >> N

Data Sparsity in High-D



Overfitting Risks

Models memorize training data rather than learning generalizable patterns

Distance Metrics Fail

All points appear equidistant in very high dimensions

Sparse Data Space

Data points become increasingly sparse in high-dimensional space

Computational Cost

Training time and memory requirements grow exponentially

✓ Solutions & Strategies

- Regularization (L1/L2)
- Feature Selection
- Dimensionality Reduction
- Cross-validation
- Domain Knowledge