When NOT to Use Neural Networks

(Sometimes simpler is better)

Small Dataset

N < 1000 samples
NNs will overfit; use linear models, trees

Interpretability Required

Need to explain decisions
(medical, legal, finance)

Tabular Data

Structured data with few features
Gradient boosting often wins

Simple Relationships

Linear or nearly linear patterns
Linear regression works fine

Limited Compute

Edge devices, real-time constraints
Simpler models are faster

Domain Knowledge Exists

Physics, rules are known
Encode them directly

DO Use NNs When:

+ Large dataset (N > 10,000)
+ Complex patterns (images, text, audio)
+ High-dimensional inputs
+ State-of-the-art needed
+ Ample compute available

Strong Alternatives:

- XGBoost / LightGBM
- Random Forest
- Logistic/Linear Regression
- Support Vector Machines
- Bayesian methods

Decision Rule: Start simple, add complexity only when needed

Linear Model -> Decision Trees/Boosting -> Neural Networks