

Gefördert durch:



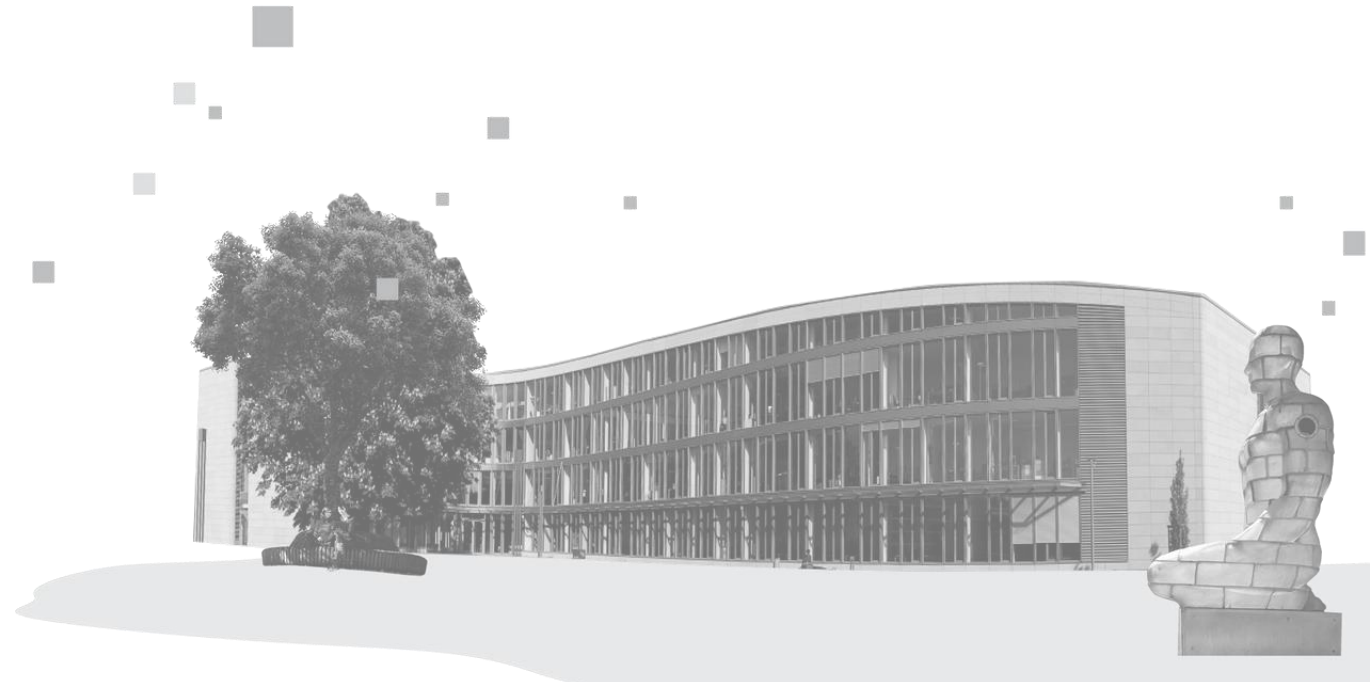
Time Series Forecasting

2.4 Combining models

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What we'll cover in this video

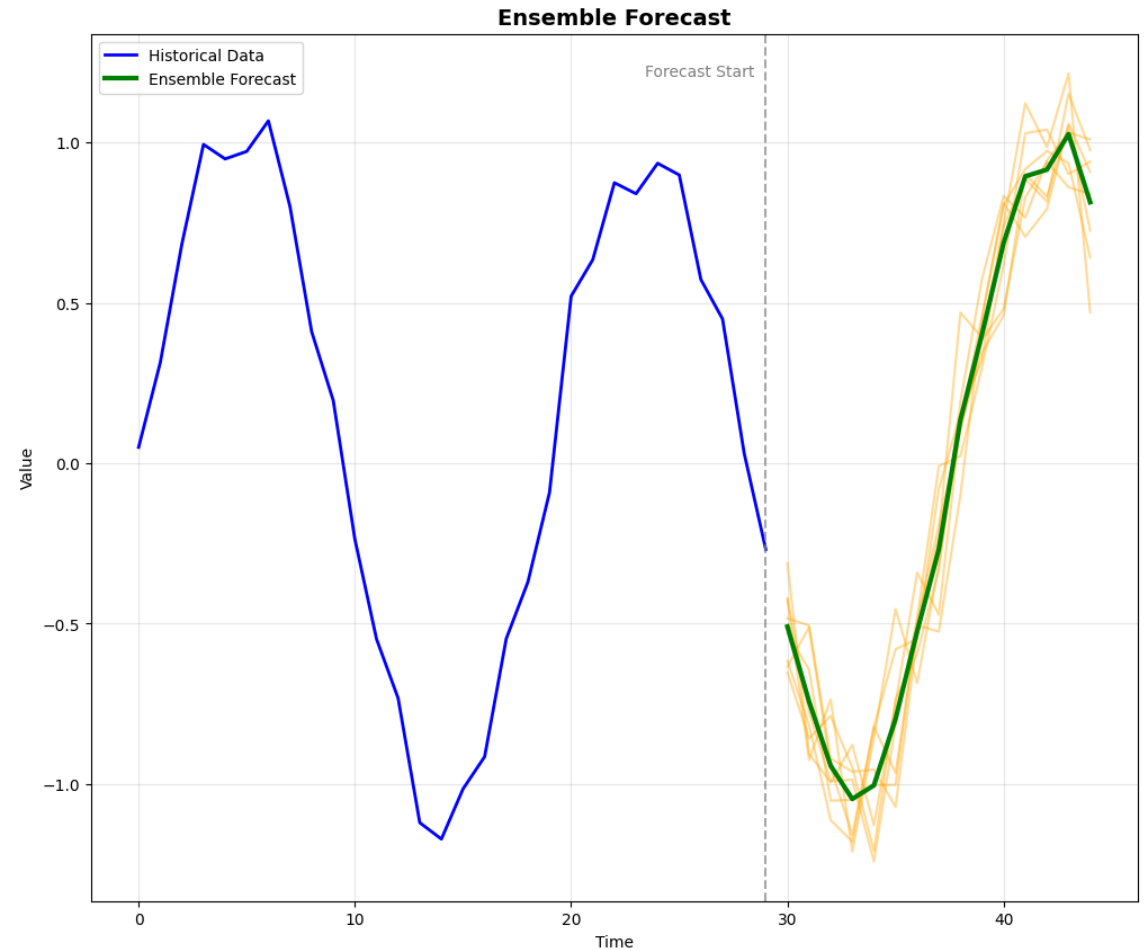


- Why and when to combine models
- Simple ensembles: mean & median
- Optimizing model weights with heuristics
- Optimal weighted ensembles
- Advanced techniques: stacking & blending

Why and when to combine models



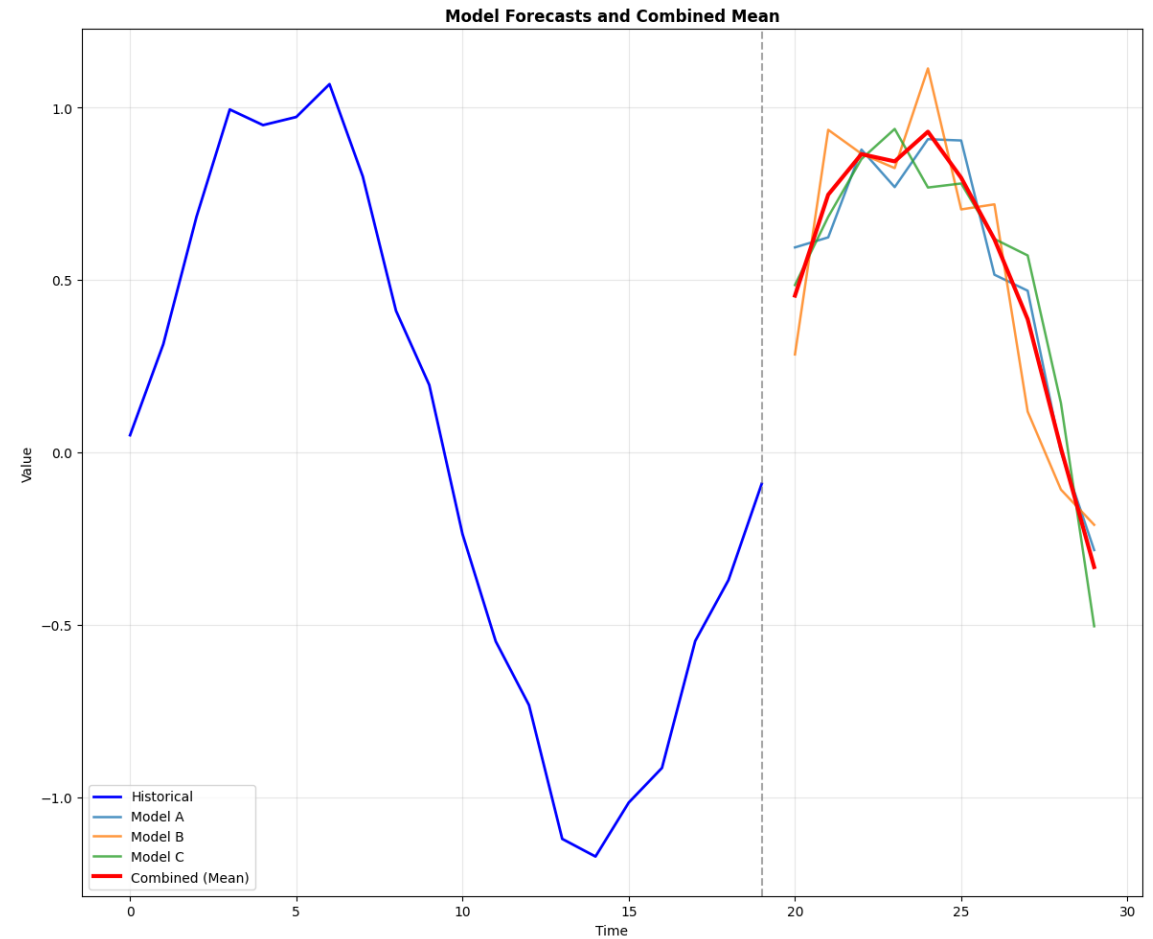
- No single model is best for every dataset or time period
- Combining models can reduce variance and bias
- Helps capture different patterns missed by individual models
- Increases robustness to changes in data
- Often improves forecast accuracy in real-world settings



Simple Ensemble Methods

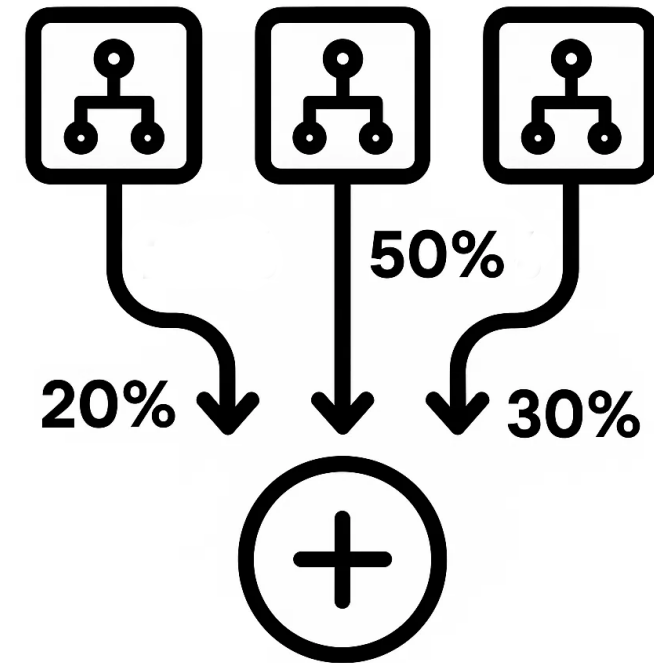


- Mean: Average predictions from all models
- Median: Use the middle prediction for robustness against outliers
- Easy to implement, no tuning required
- Often outperforms single models by reducing variance



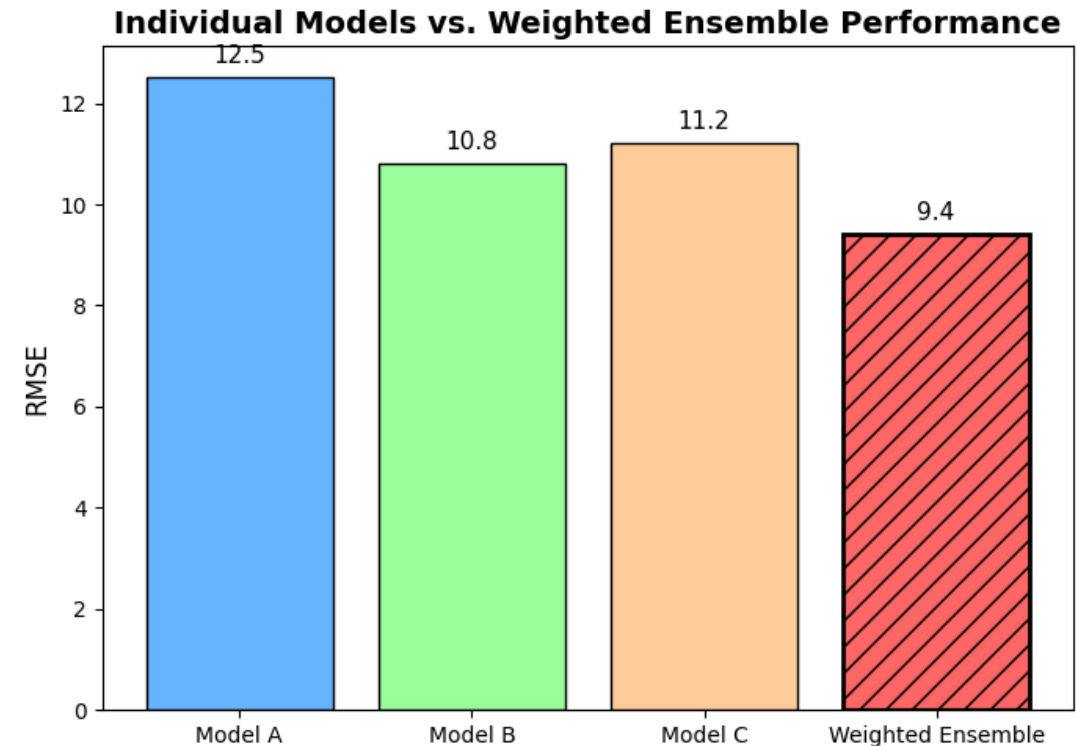
Heuristic Optimization for Ensemble Weights

- Goal: Assign better weights to each model's forecast
- Stochastic hill climbing: Iteratively adjust weights for improvement
- Simulated annealing: Explore broadly to avoid local optima
- Useful for small-to-medium sets of models



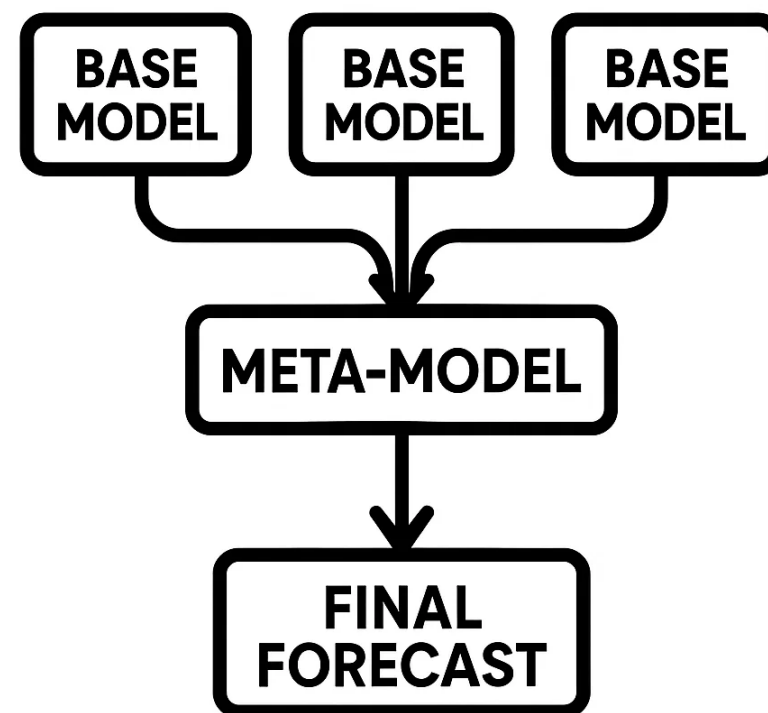
Optimal Weighted Ensemble

- Finds mathematically optimal weights for each model
- Often solved using constrained optimization (e.g., non-negative weights summing to 1)
- Requires historical forecast errors for each model
- Produces a balanced combination that minimizes overall error



Stacking and Blending

- **Stacking:** Train a meta-model on predictions from base models
- **Blending:** Similar to stacking, but often uses a simple holdout set instead of cross-validation
- Can capture complex relationships between model outputs
- Widely used in machine learning competitions for top performance



What we've learnt



- No single model is perfect; combining improves accuracy and robustness
- Simple ensembles like mean and median are easy and effective starting points
- Heuristic and mathematical weighting can boost performance further
- Advanced methods like stacking and blending capture complex relationships
- Choose combination methods based on your data, goals, and resources