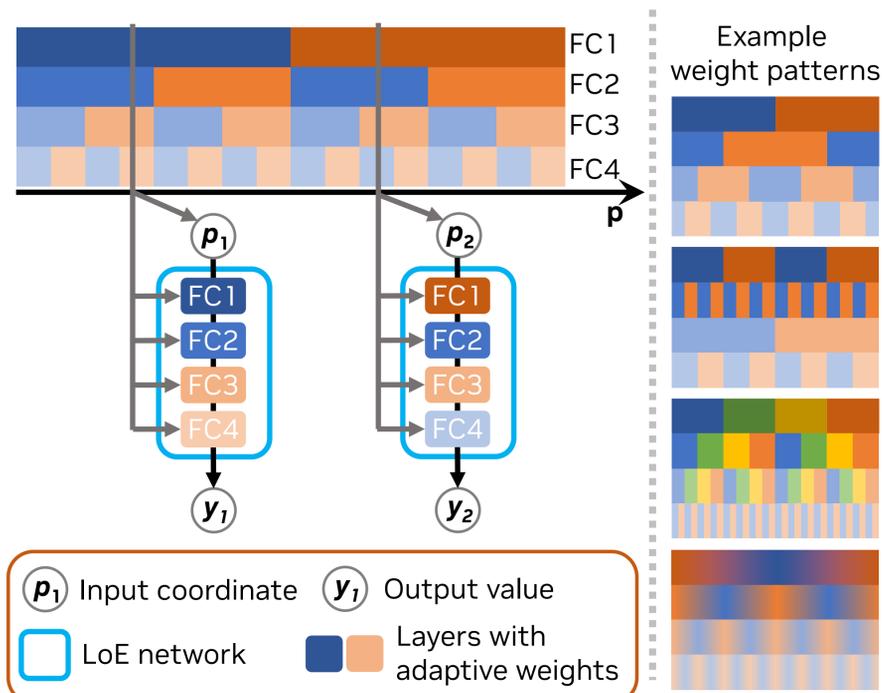


Motivation

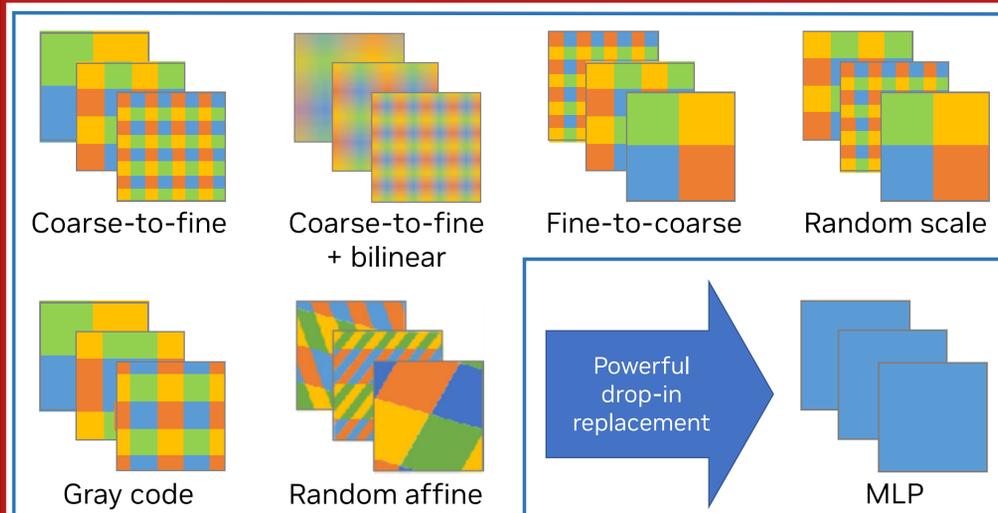
- Coordinate-based networks, usually in the forms of MLPs, are **difficult to scale** to high-resolution signals or large datasets due to prohibitive computational cost.
- Levels-of-Experts (LoE) brings **hierarchical, input-dependent weights** to MLPs, allowing a coordinate-based network to scale up without increasing computation.
- Compared to other hybrid networks, LoE does not require extra networks, retains a **compact latent representation**, and achieves **good parameter efficiency**

What is Levels-of-Experts (LoE)



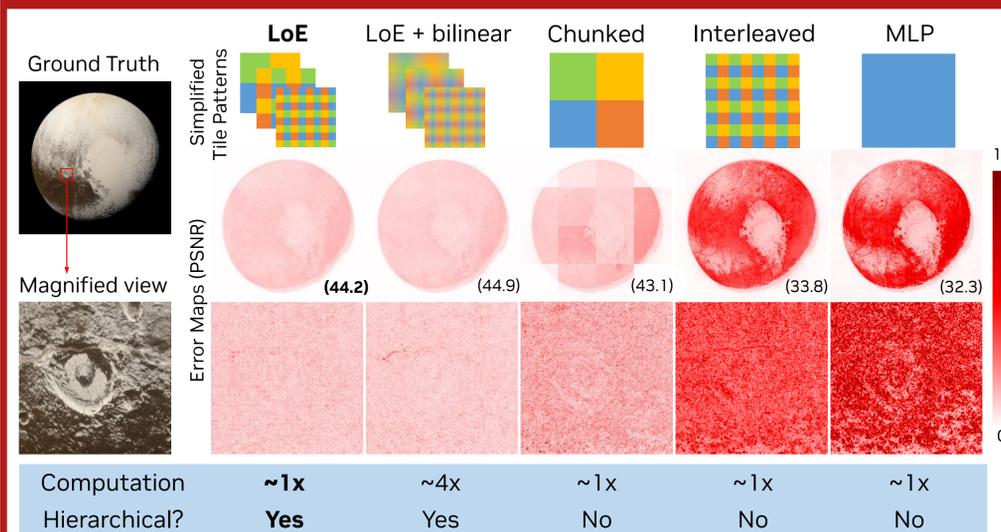
- Each of the linear layer has multiple banks of weights, arranged in a repeating grid pattern.
- Given an input p , the weight for each linear layer is determined based on where p lands on the grid.
- For better performance, different grid scale is used for different layers.
- The computational cost of a LoE network is independent of number of weight banks. In fact, when #banks = 1, LoE reverts to a regular MLP.

Levels-of-Experts in Higher Dimensions



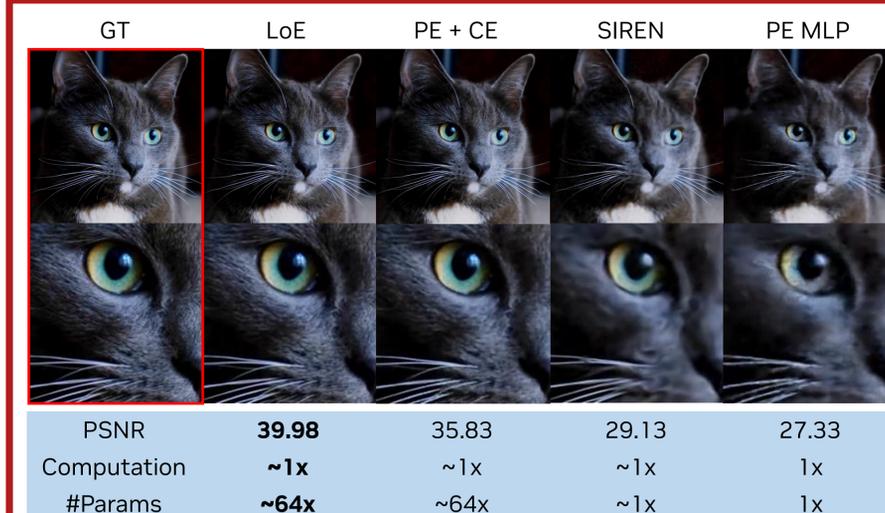
- LoE can generalize to 2D and 3D easily by using 2D or 3D grids for the weights.
- A wide range of grid patterns and interpolation methods are possible. The grids do not need to be axis-aligned or follow any specific order.
- Drop-in replacement for coordinate-based MLP, achieving better model capacity **without the extra computation**.

High-resolution Image Fitting



- LoE achieves the **best performance** at the same computational cost.
- Having **hierarchical weight grids** is crucial for the performance of LoE.
- LoE **does not require smooth interpolation** of weights to perform well.

Video Fitting



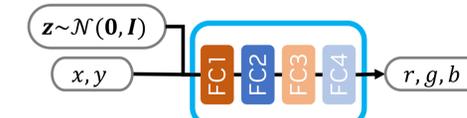
- LoE achieves the **best performance** at the same computational cost and parameter count.

Novel View Synthesis



- LoE performs well even when supervised indirectly.
- Hierarchical weight grids encourage smooth results.

Conditional-independent Generation



- LoE supports a **compact latent space**.
- It can be used directly as a generator without the need of any auxiliary networks.

