Dynamic Scene Representation in the Era of Neural Rendering: From NeRFs to 3DGSs

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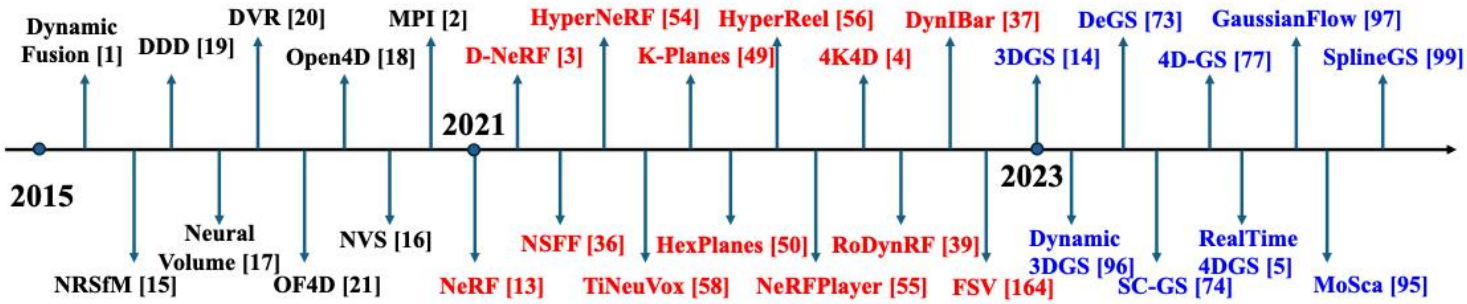
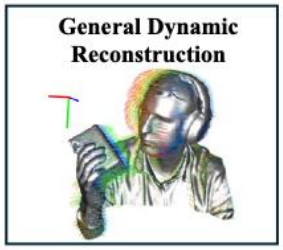
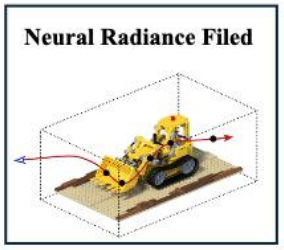
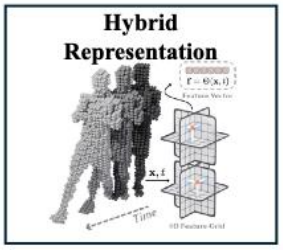
Review Topic

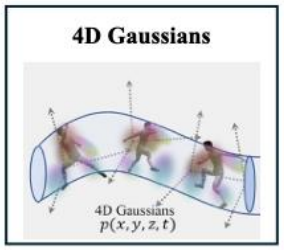
- This review aims to address the following research questions:
  - What are the core technical principles of dynamic NeRF and 3DGS?
  - How can dynamic NeRF and 3DGS methods be classified based on their motion modeling strategies?
  - What are the current limitations and future directions for dynamic neural rendering?
- Ideas: Classifying dynamic NeRF and 3DGS methods based on their motion modeling approaches to analyze relative merits, identify limitations, and propose future research directions.











Main Contributions

- Contributions:
  - We comprehensively summarize dynamic NeRF and 3DGS in terms of representations, motion modeling, and computational efficiency ;
  - Based on motion modeling strategies, we classify dynamic NeRF and dynamic 3DGS separately and conduct a systematic analysis of the techniques in each category ;
  - We analyze the current limitations of dynamic neural rendering and propose several promising avenues for future work to stimulate further development in this rapidly evolving field.

Dynamic neural rendering models dynamic scenes and synthesizes novel views by extracting spatiotemporal information from videos to reconstruct 3D scenes and generate realistic novel-view videos.