CfACTs Introduction Framestore is a world leading visual effects company, producing award winning content within the domains of feature film, long form, commercial and interactive entertainment. Framestore's Rendering Team develops and supports the software used for rendering our production quality visual effects and includes our in-house renderer 'Freak', state-of-the-art shader libraries, and artist focused rendering tools that are used globally across all of Framestore's film projects. We believe there exists an opportunity for practical, production focused innovative research that can both extend the domain of knowledge and directly impact the quality and efficiency of the imagery that we create. We envisage, by allowing researchers to leverage our cutting edge workflows and technologies, and use our production level datasets, we can inspire, accelerate and focus innovation that can be applied within the production context.

Learned Resolution Independent Rendering for Feature Films

Introduction Visual media content is being produced and consumed at ever increasing resolutions. These improvements afford dramatic levels of fidelity and detail to the viewer, but their generation often incurs significant computational cost. We would like to explore the use of machine learning (ML) to enable us to decouple our sampling rate from our final image resolution. Using progressive techniques and leveraging in-renderer data we hope to generate high quality, super resolution content, within a significantly reduced computational footprint. To ensure applicability to the production environment, importance should be placed in maintaining temporal coherency and a robust handling of a wide range of visual phenomena, such as hair, geometric details, motion blur and volumetric media. The research and implementation of techniques that solve these problems would bring wide ranging efficiencies to the generation of high resolution content.

Literature Much research is focused on upscaling single images (Wang, 2018), but this is generally not applicable to feature film. Recent studio driven research (Vavilala, 2020) hints at positive results within this context. There is also much research around using ML for denoising (Bako, 2017) which shares many of the same challenges.

References *Bako, S., Vogels, T., McWilliams, B., Meyer, M., Novák, J., Harvill, A., Sen, P., DeRose, T., & Rousselle, F. (2017). Kernel-predicting convolutional networks for denoising Monte Carlo renderings. ACM Trans. Graph., 36, 97:1-97:14.Vavilala, V., & Meyer, M. (2020). Deep Learned Super Resolution for Feature Film Production. Special Interest Group on Computer Graphics and Interactive Techniques Conference Talks. Wang, Y., Perazzi, F., McWilliams, B., Sorkine-Hornung, A., Sorkine-Hornung, O., & Schroers, C. (2018). A Fully Progressive Approach to Single-Image Super-Resolution. 2018 IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPRW), 977-97709.*

Deliverables Working within our pipeline, and using our in-house renderer Freak, research and prototype methodologies that leverage ML to efficiently and robustly generate production quality renders at super resolutions.

Impact This work has the potential to both extend the domain of knowledge and significantly improve the efficiency of rendered image generation.