

Generative AI applications in manufacturing industry

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AI applications in manufacturing industry

Modern AI

Numerical data, measurements, data storages, pictures

A combination of algorithms, ML techniques, data analytics, mostly supervised

Tasks requiring analysing, reasoning and decision making



Generative AI

Text, images, music, videos

Models are based on large datasets of existing content, unsupervised

Tasks requiring creativity and imagination

Manufacturing applications

Autonomous factories, robotics, process control

Predictive maintenance, self-healing systems

Generative design

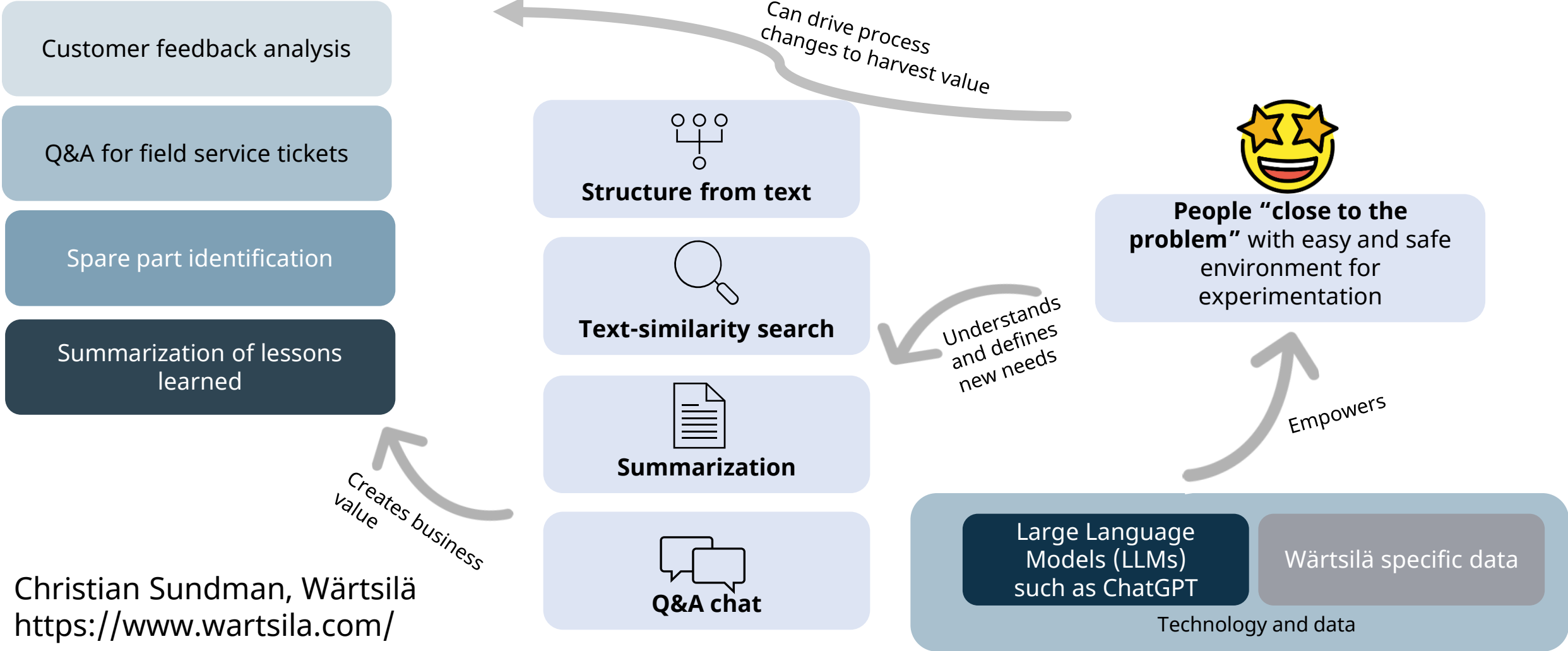


Training and knowledge transfer - skills development, maintenance, instructions

Questioning product/company information - company chatbot

Product design and development

Wärtsilä case study - Our goal is to create Gen AI toolkit to address challenges across Wärtsilä by empowering people who know the problems with technology



Christian Sundman, Wärtsilä
<https://www.wartsila.com/>

Generating Novel Views with NeRF and Segmenting Objects

Challenges/Needs:

- Industry is moving towards modeling massive 3D virtual worlds and data acquisition in 3D
- Growing need for scalable industry-specific content creation tools in terms of quantity, quality and variety of 3D content.
- Synthesizing novel views of a captured 3D scene is a challenge to provide an immersive user experience comparing to static image demonstration for many domains including VR/AR reality applications. Achieving free-viewpoint navigation of 3D scenes and objects is a demanding task.

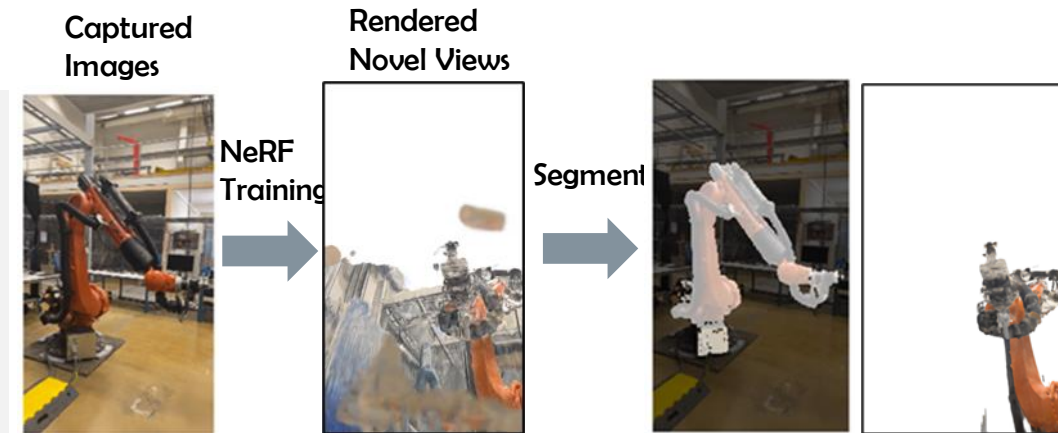
Solution

Neural Radiance Fields (NeRFs) [1] brings a remarkable solution to synthesis (generate) novel photo-realistic views with complex view-dependent effects.

- To obtain photo-realistic 3D scenes with free-viewpoint navigation feature.
- Segment Anything in 3D model (SA3D) [2] inherits the features of SAM model for NeRF-scene segmentation.
- The model allows the annotation of targeted objects in 3D scene with zero-shot generalization and provide a 3D model of the object that can be further converted into 3D assets.

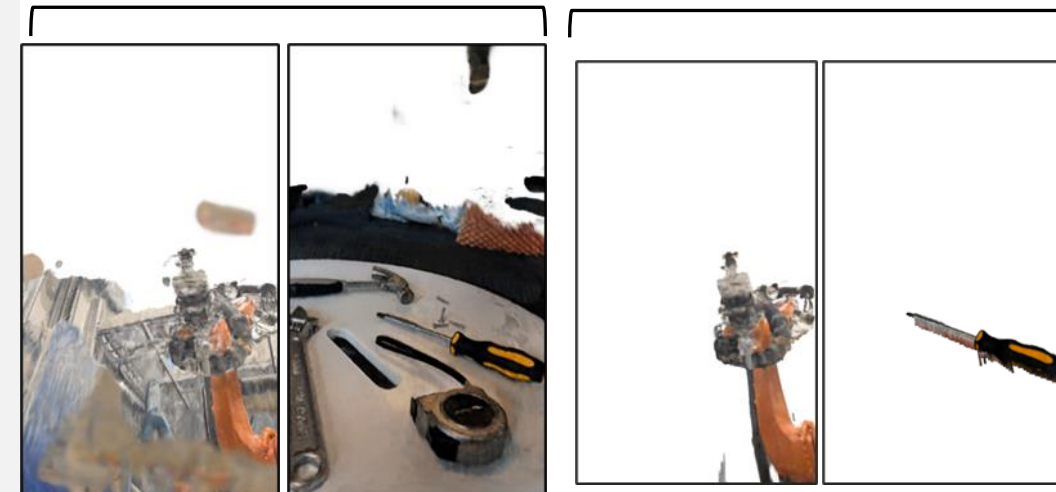
Benefits:

- The NeRF approach provides photo-realistic 3D scenes that can be used for workplace transformation within immersive technologies.
- The SA3D approach provides solutions for data acquisition and annotation procedure in 3D.



1st Step Render a View with NeRF

2st Step Segment 3D Object with SA3D



Scene with a Robot

Scene with an Assembly Table

Robot

Screw Driver

[1] Mildenhall, Ben, et al. "Nerf: Representing scenes as neural radiance fields for view synthesis." *Communications of the ACM* 65.1 (2021): 99-106. [2] Cen, Jiazhong, et al. "Segment anything in 3d with nerfs." *arXiv preprint arXiv:2304.12308* (2023).