Towards Sim-to-Real Industrial Parts Classification with Synthetic Dataset

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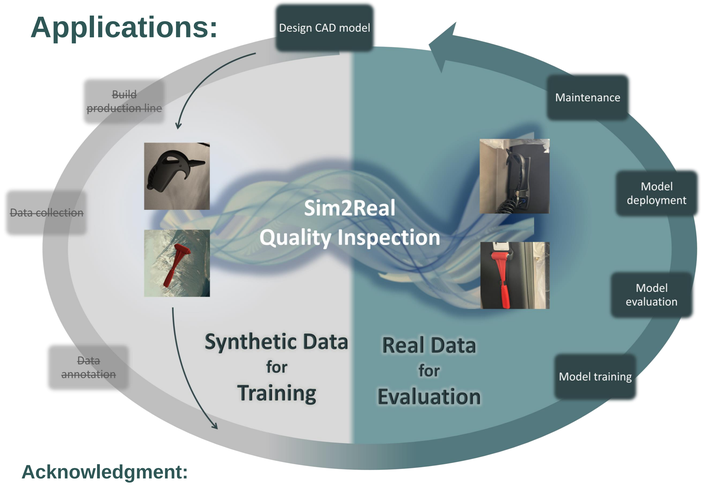
Introduction of the Synthetic Industrial Parts dataset (SIP-17)

- Designed for Sim-to-Real challenge in Industrial Parts Classification.
- Comprises 17 objects that represent six industry use cases. Including isolated parts and assembled parts.
- Syn_O: synthetic data generated from CAD models without random backgrounds, lights, and post-processing. 1,500 images per category.
- Syn_R: synthetic data generated from CAD models with random backgrounds, lights, and post-processing. 1,500 images per category.
- Real: 566 real images for testing.

Applications:



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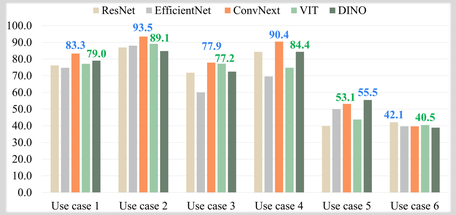
Benchmark:

Five models:

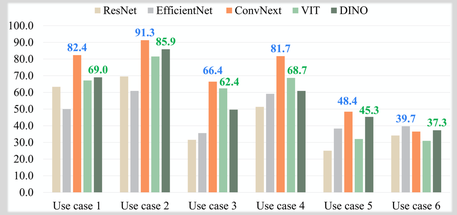
- ResNet 152 [1]
- EfficientNet B7 [2]
- ConvNext base [3]
- Vision Transformer (ViT) base p16 [4]
- DINO self-supervised learning with ViT base p16 [5]

Results:

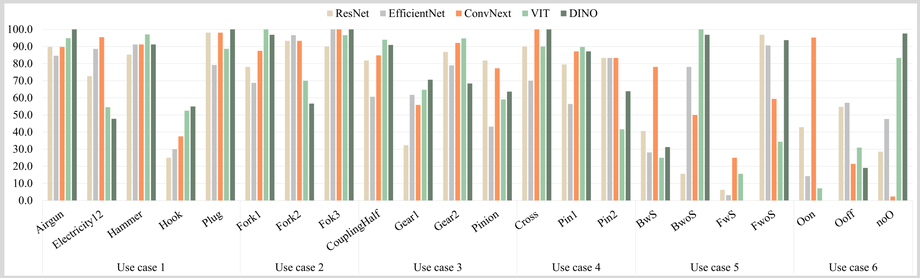
Syn_R accuracy (%)



Syn_O accuracy (%)



Syn_R class-wise accuracy (%)



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SIP-17: