

A Closer Look at the Developments of Super Resolution

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Credit to Christian Galea's Towards Data Science article
"Image Super-Resolution: An Overview of the Current State of Research"

Background



Credit to Phojo's article: Photo Restoration



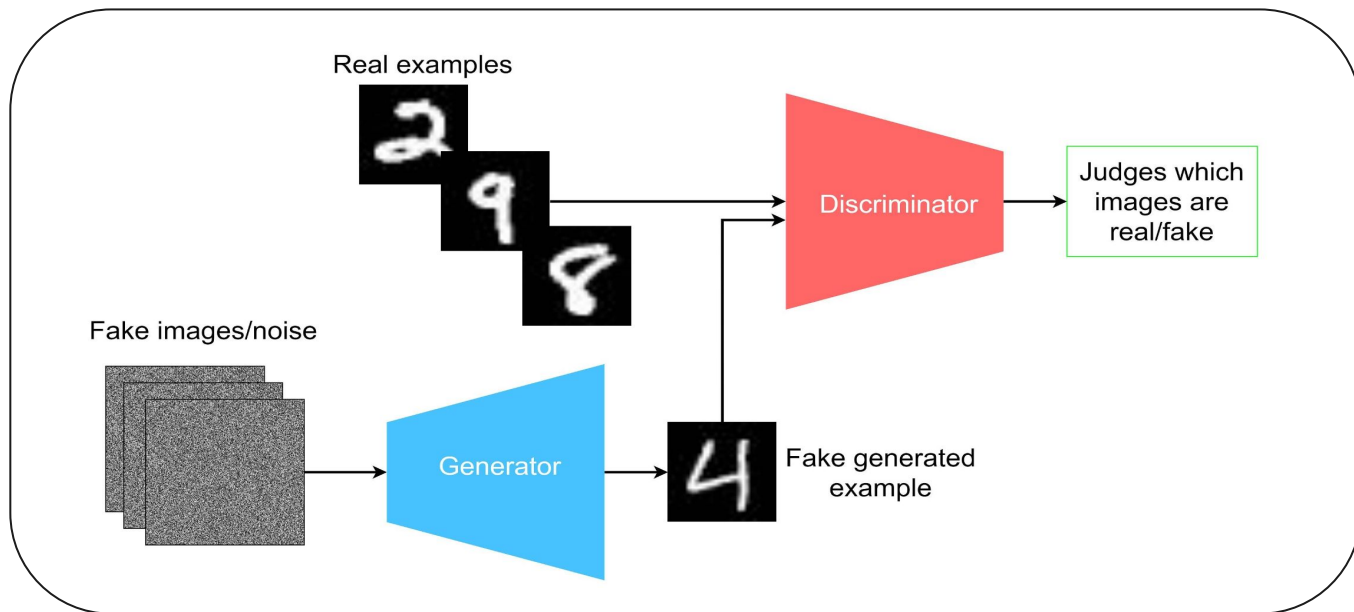
Credit to Rémi Cresson's mdl4eo article
"Enhancement of Sentinel-2 images at 1.5m"

Overview of Models



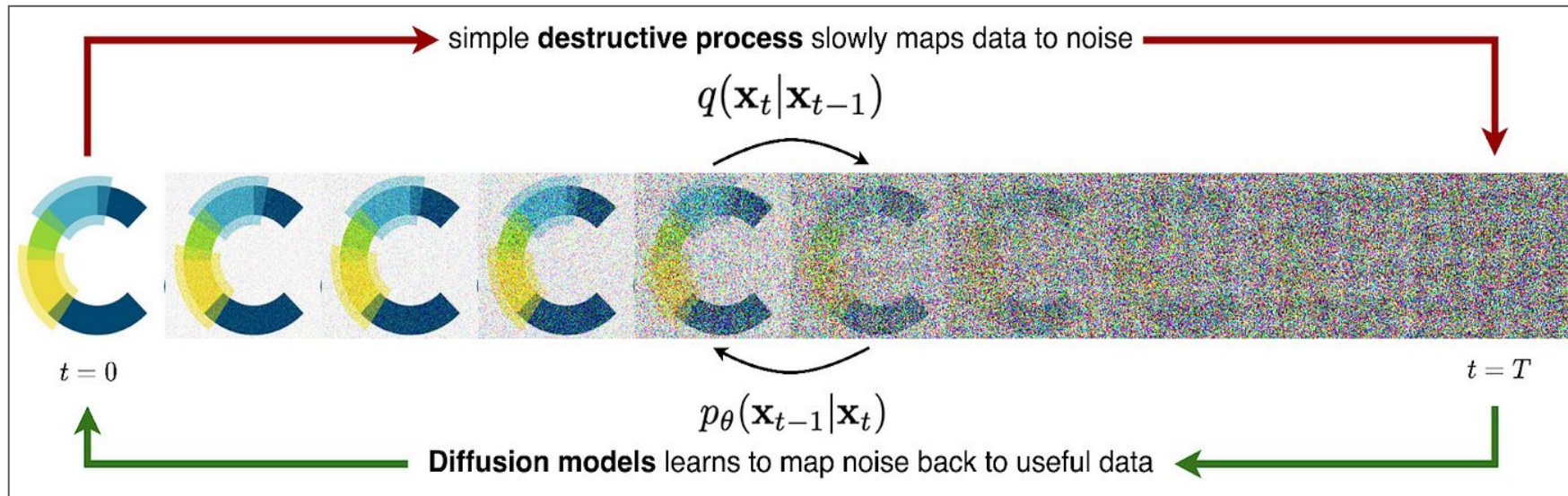
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Generative Adversarial Models (GAN Models)



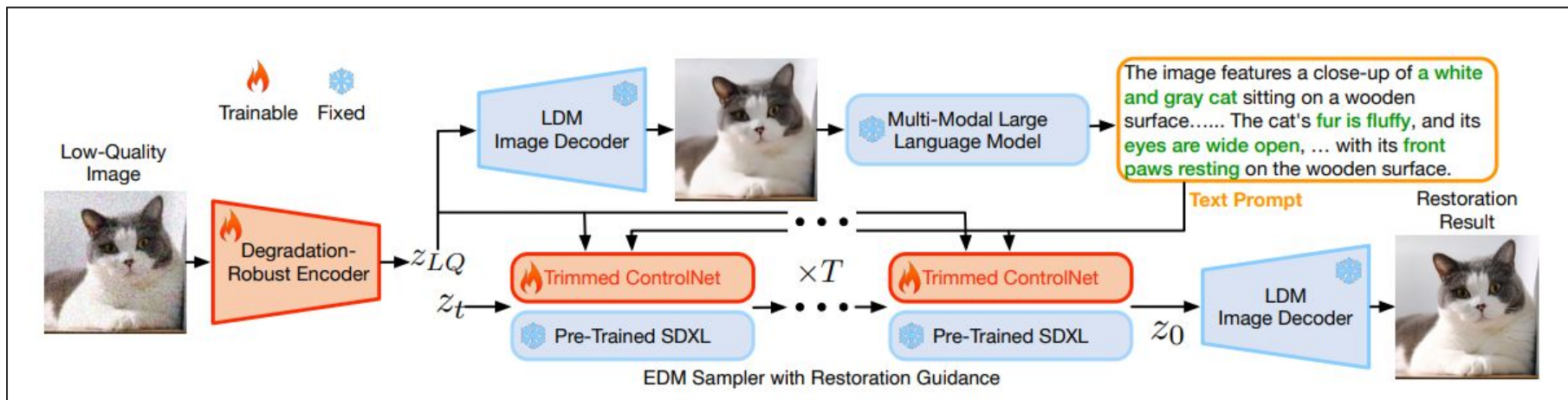
Credit to Caper Hansen's IBM Developer article
"Generative adversarial networks explained"

Diffusion Models



Credit to Charlie Harris' Medium Article
"Diffusion Models in Generative Chemistry for Drug Design"

Diffusion Model (SUPIR's method)



Credit to XPixel Group's Supir Research Paper

- Encoder Decoder: Input and Output Source
- SDXL: StableDiffusion Model
- ControlNet: Controls Diffusion Models
- Multi-Modal Model: Outputs text describing a given image

Results



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Input: 232x145



Sage Node Sample Image

Input



Real-ESRGAN



< 10 seconds

Prompt: A snowy landscape with a bushes and trees nearby

Input



SUPIR



100 secs

Input: 164x146



Input



Real-ESRGAN



< 10 seconds

Prompt: Red shed with tree in front on a snowy island and ocean scenery in back

Input



SUPIR



67 secs

Input: 220x190



Input



Real-ESRGAN



< 10 seconds

Prompt: A road surrounded by grass leading to a bus stop.

Input



SUPIR (with prompt)



68 secs

Input



SUPIR (without prompt)



68 secs

Summary of Findings



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SUPIR vs Real-ESRGAN

Advantages of Real-ESRGAN:

- Small model (<1 GB)
 - Requires <1 GB of VRAM
- Runs on CPU as well
- Fast compute time
- Deployable on Edge

Disadvantages of Real-ESRGAN

- Poor results if the image quality is too small
- Image enhancement is not very apparent

SUPIR vs Real-ESRGAN

Advantages of SUPIR:

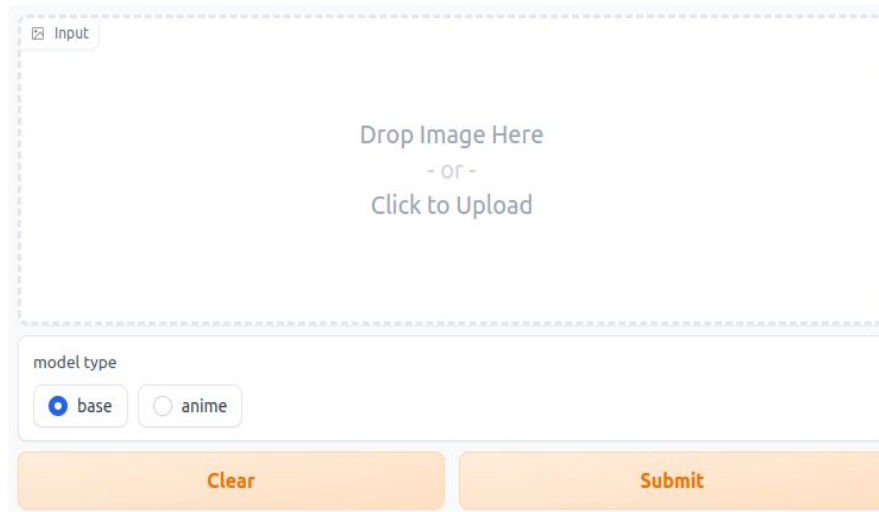
- Image enhancement is much more powerful compared to Real-ESRGAN

Disadvantages of SUPIR:

- Extremely large model (30-40 GB)
- Requires GPU
- Inefficient for large batch sizes
- Poor results if no text provided
- Poor at rendering text

Next Steps

- Finish the deployment of models onto the Sage Nodes
- Implement a Slack Bot
- Create a Web Interface / Gradio for more customization



Input

Drop Image Here
- or -
Click to Upload

model type

☒ base ☐ anime

Clear Submit

Thank you!



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