

# 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 Phojoe's article: Photo Restoration



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

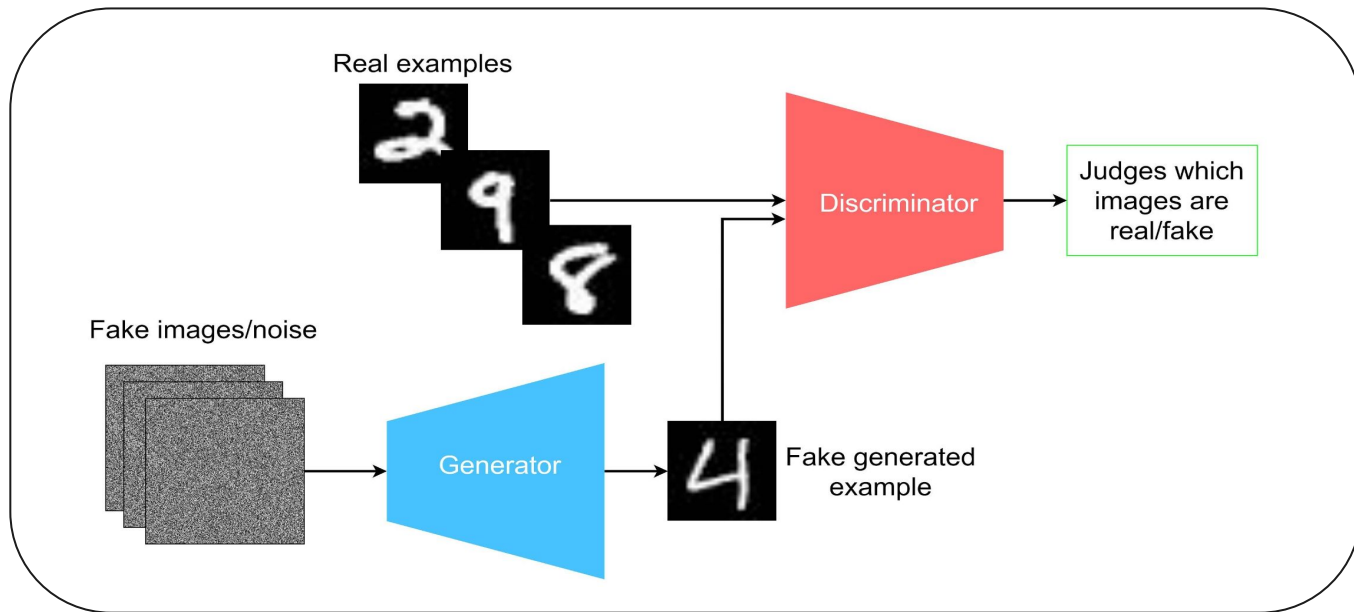
# Overview of Models



Argonne National Laboratory is a  
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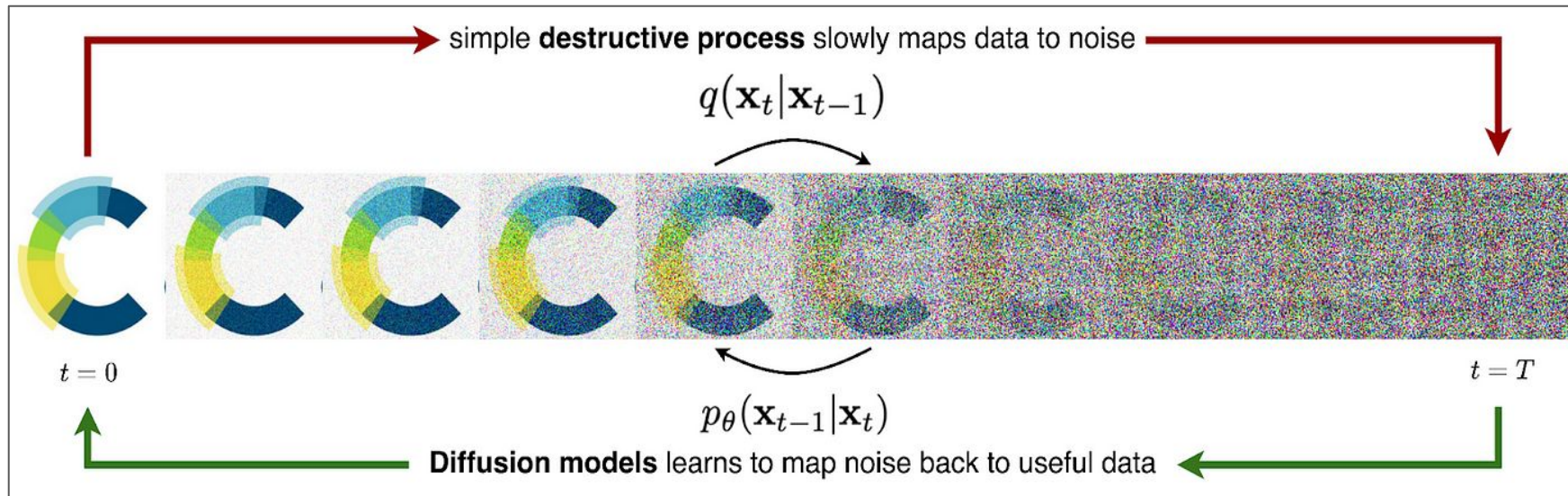
# Generative Adversarial Models (GAN Models)



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

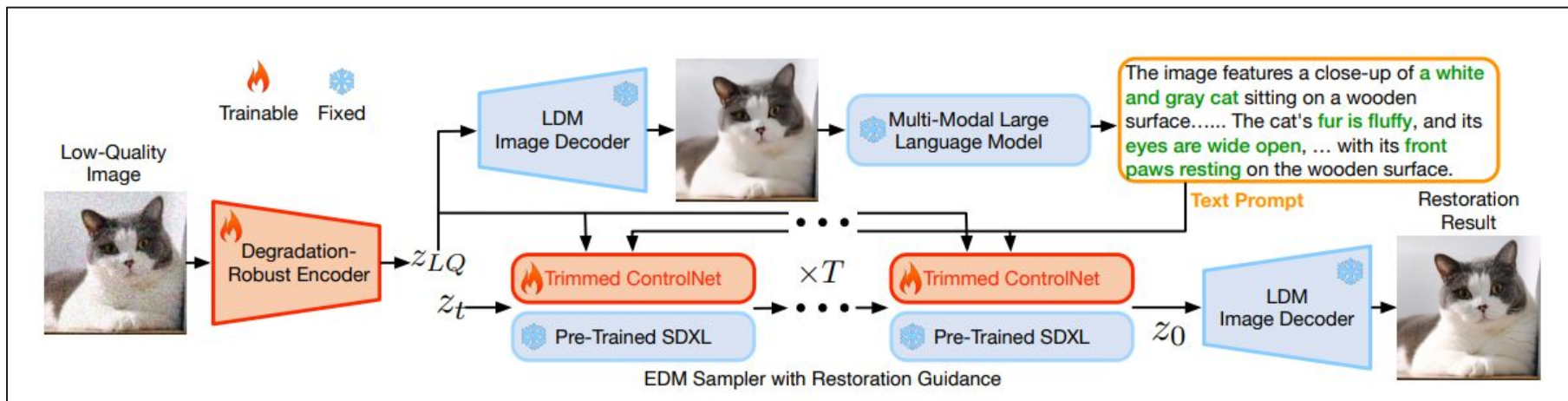


# Diffusion Models



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

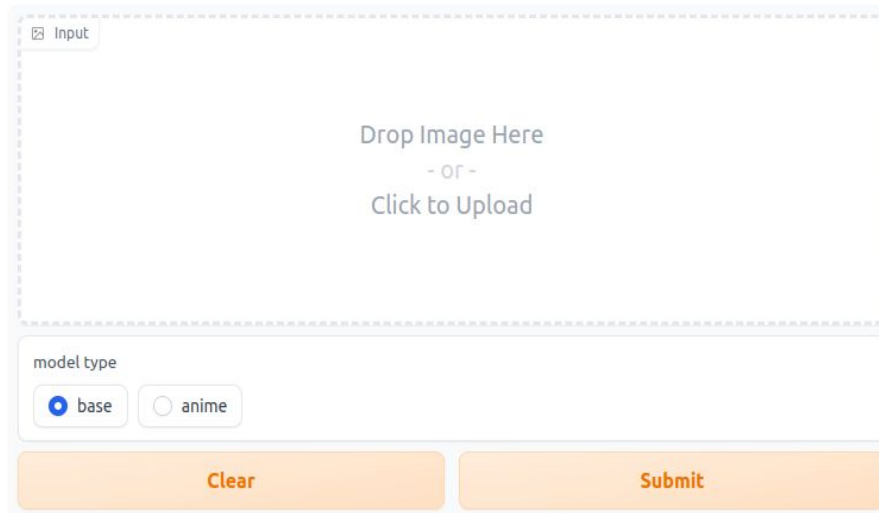
## Disadvantages of SUPIR:

- 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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