



BentoColor





Our Progress

Family Albums
Independent Artists
Museum Exhibits



Our Progress

- Family Albums
- Independent Artists
- Museum Exhibits
- Broadcasters
- Streaming Services





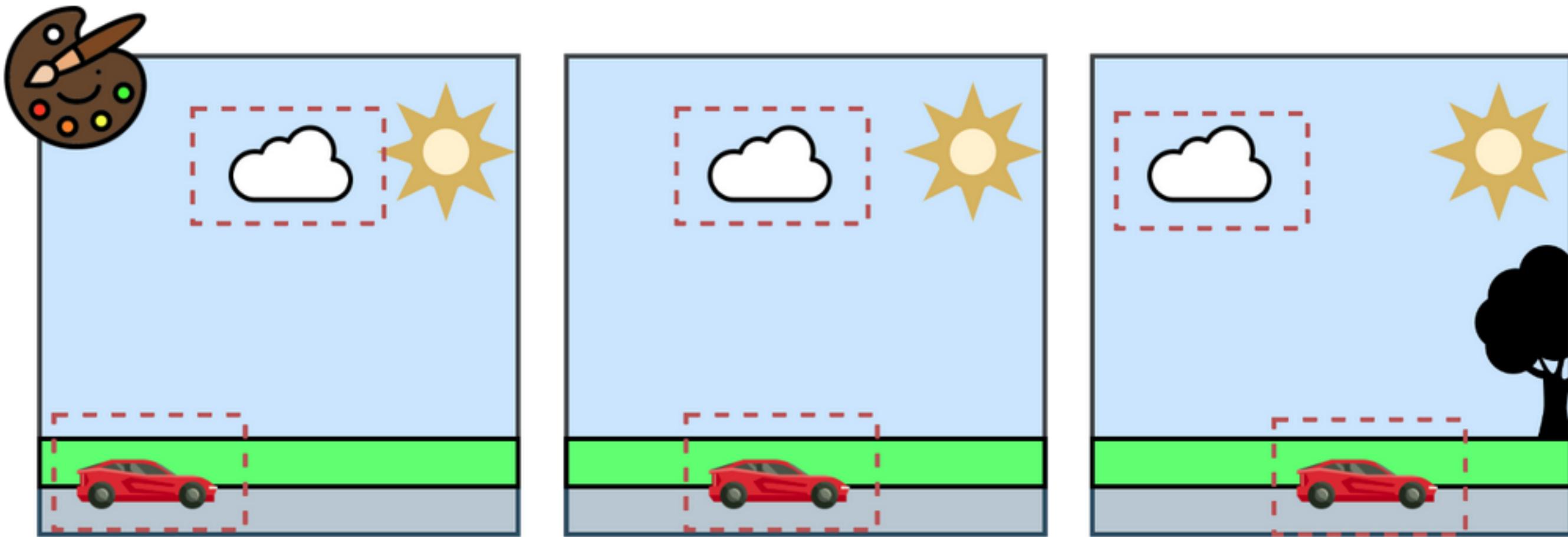






The Current Process
is Slow and Labor Intensive



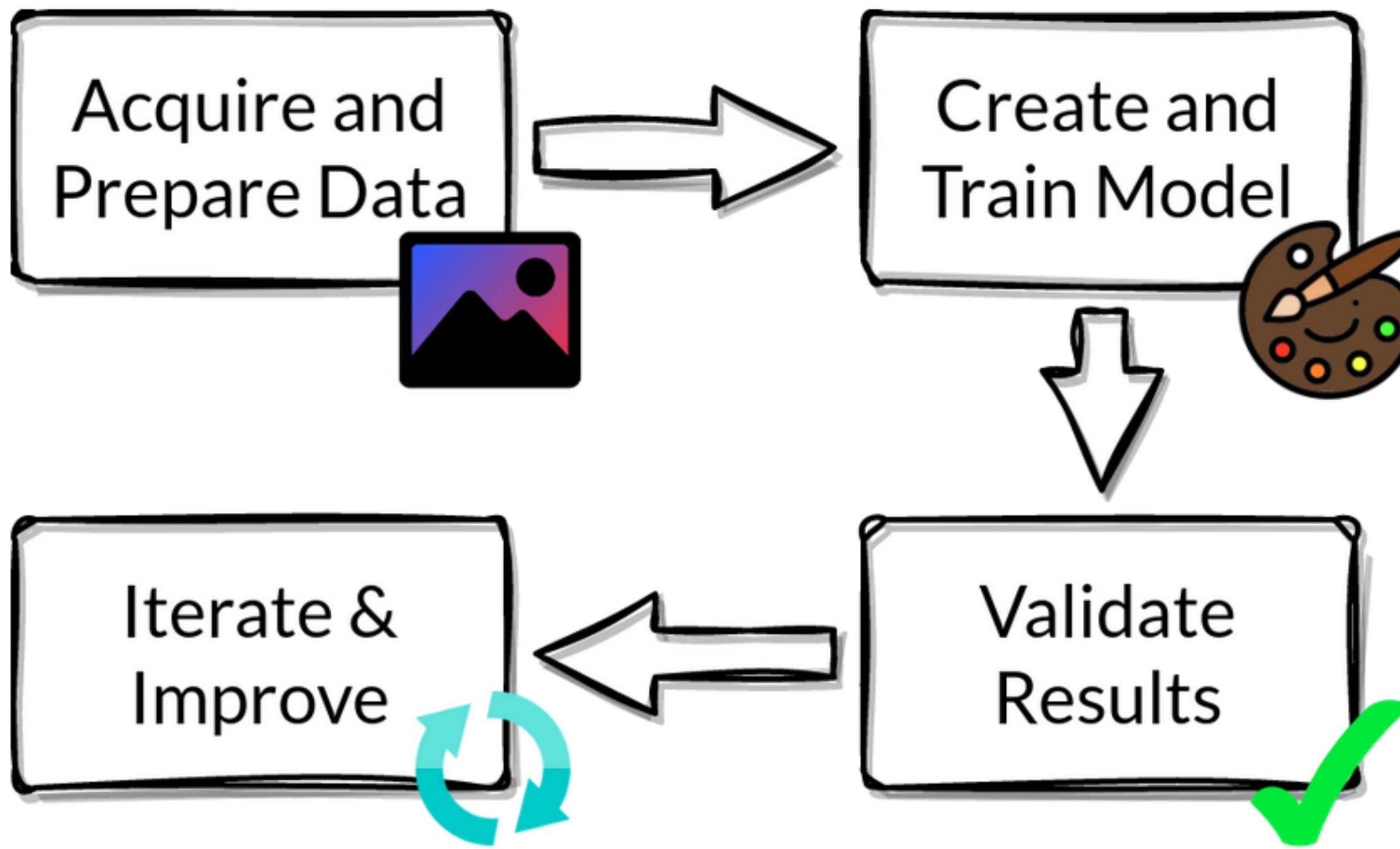




Automatic Colorization

For **Images** and **Videos**
Using Machine Learning







No One
Right Answer





Colorization
is Subjective





Landscape Recognition Dataset

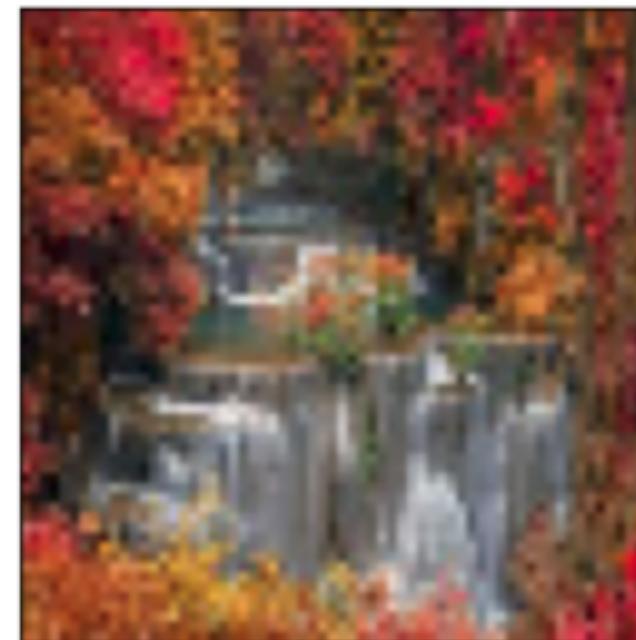
12,000 Images

Reduced in Size

Flipped and Rotated for Variety



Example Images





Simple Model

Neural Network

Reconstruct Original Colors



Adversarial Model

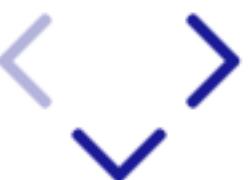
Two Competing Halves

Forger and Detective

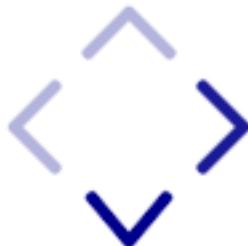
Generate Novel Colors

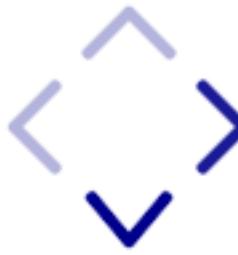
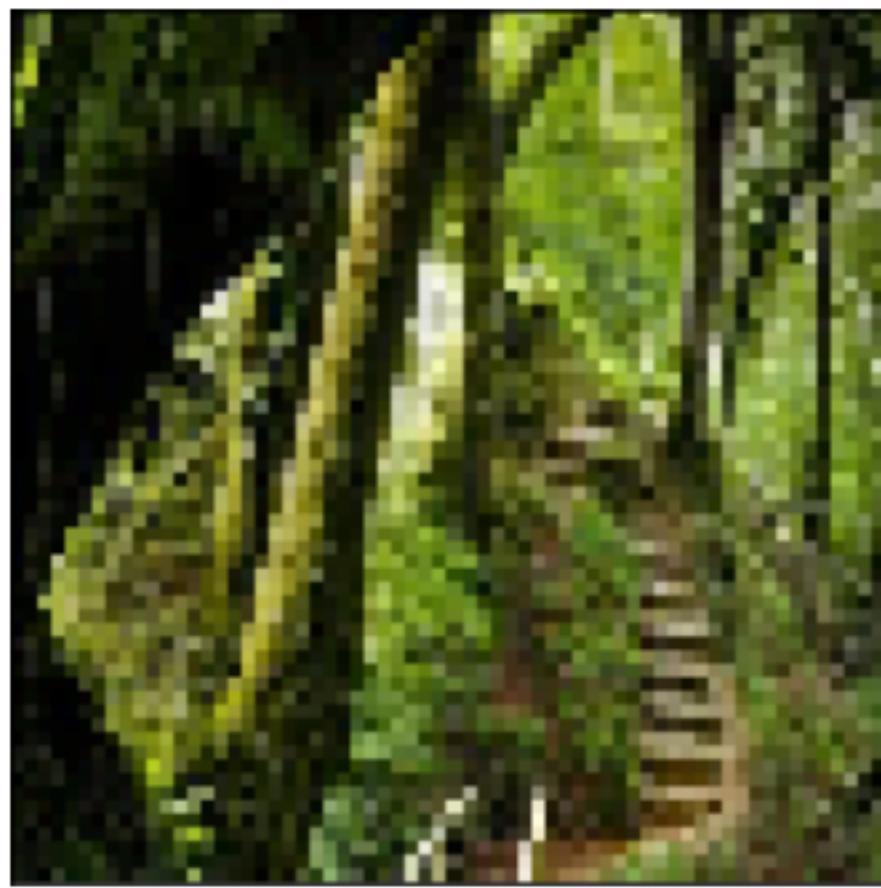


Results



Gray Input

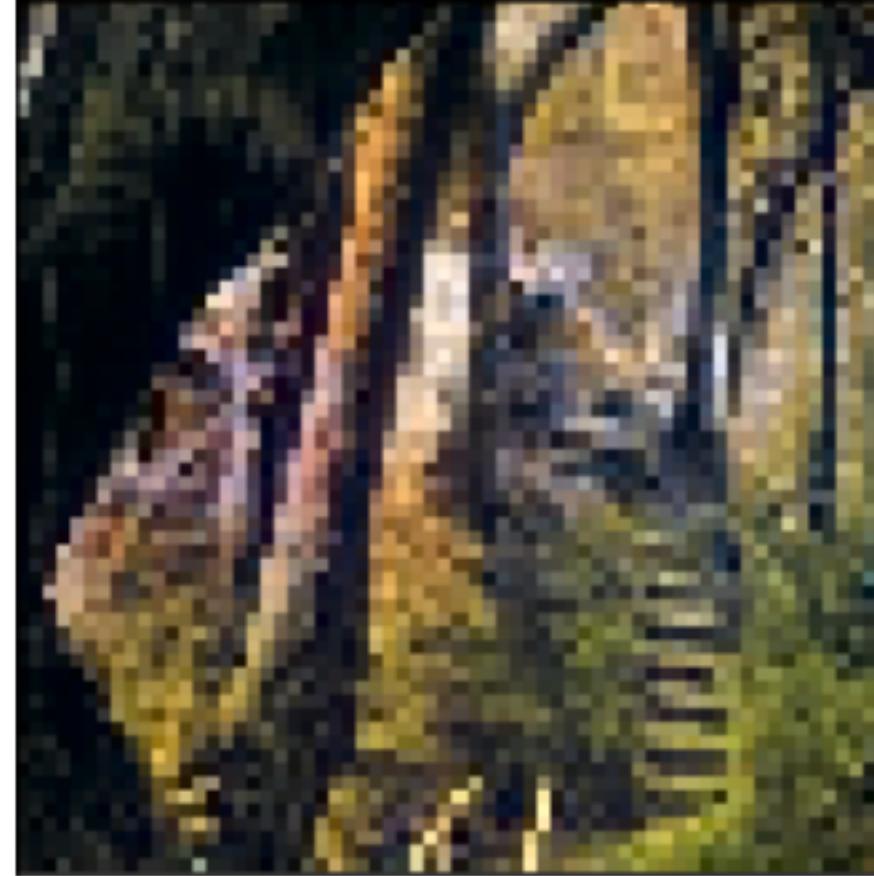




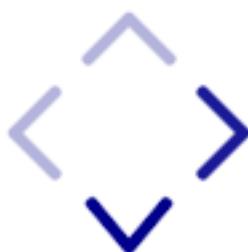
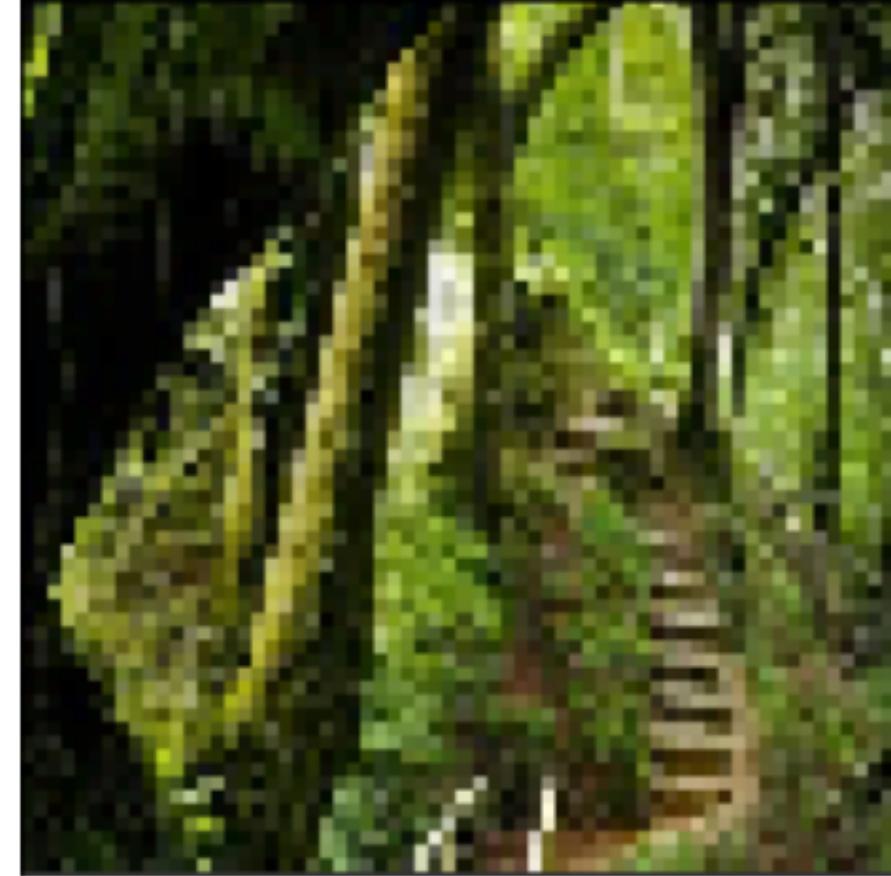
Simple Model



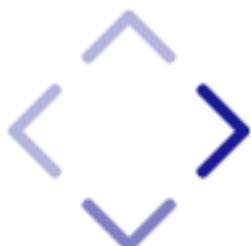
Adversarial Model



Original Image



Gray Input



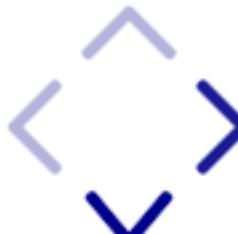
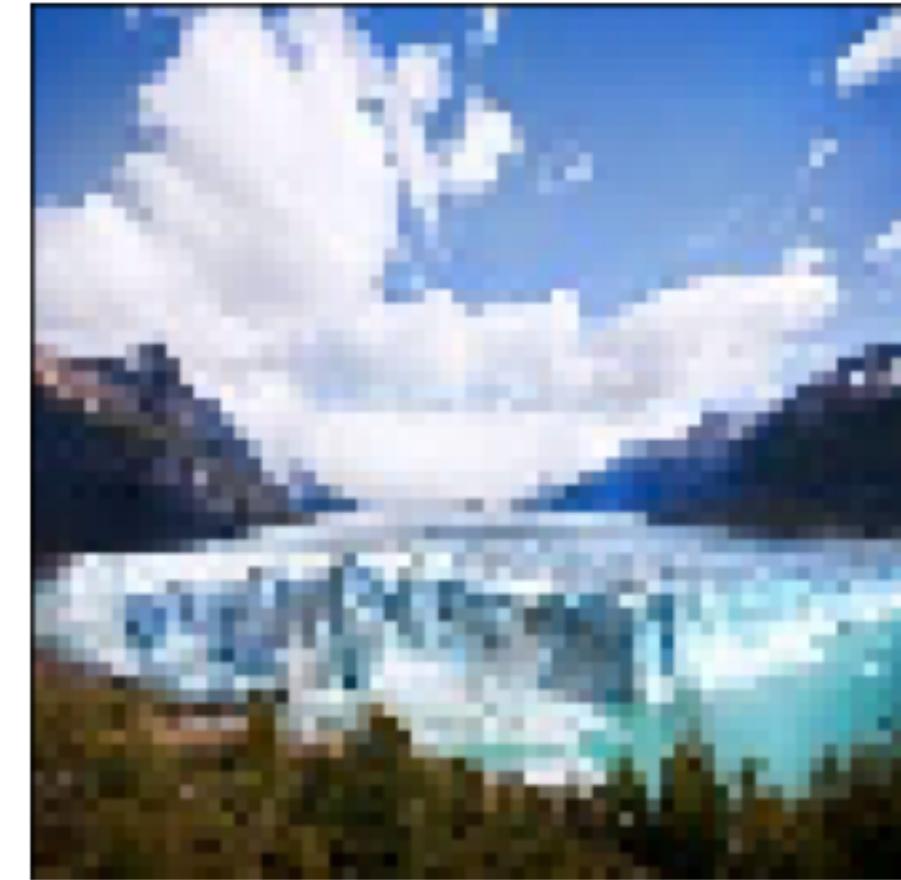
Simple Model



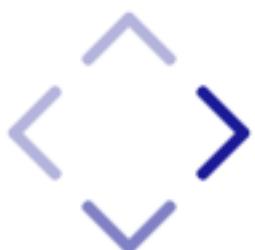
Adversarial Model



Original Image



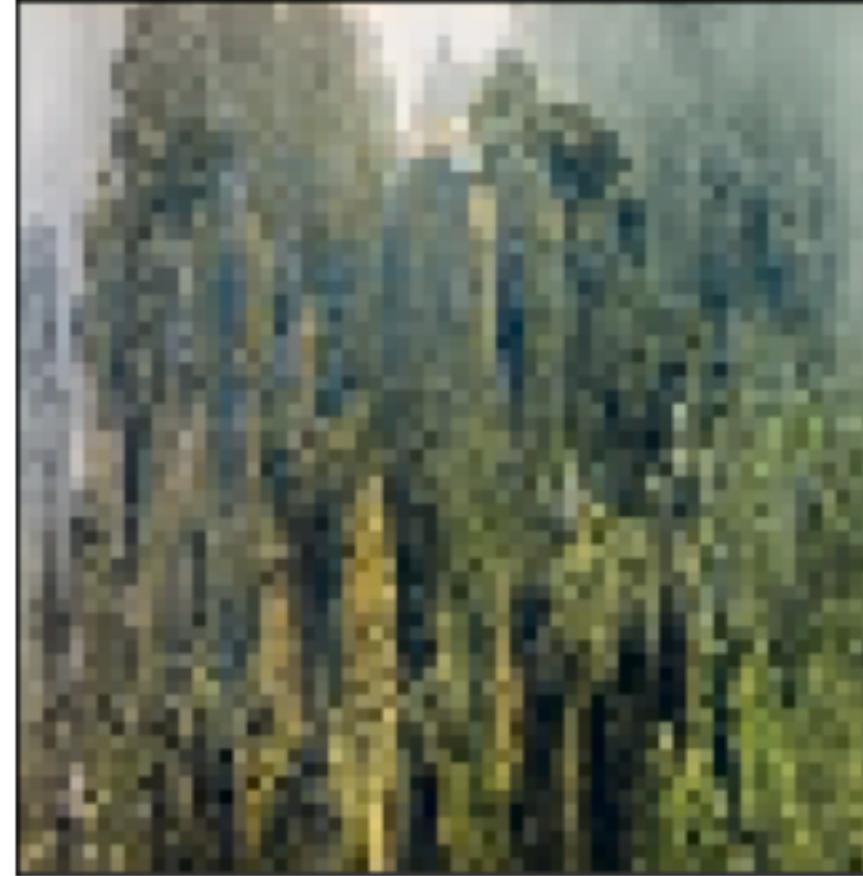
Gray Input



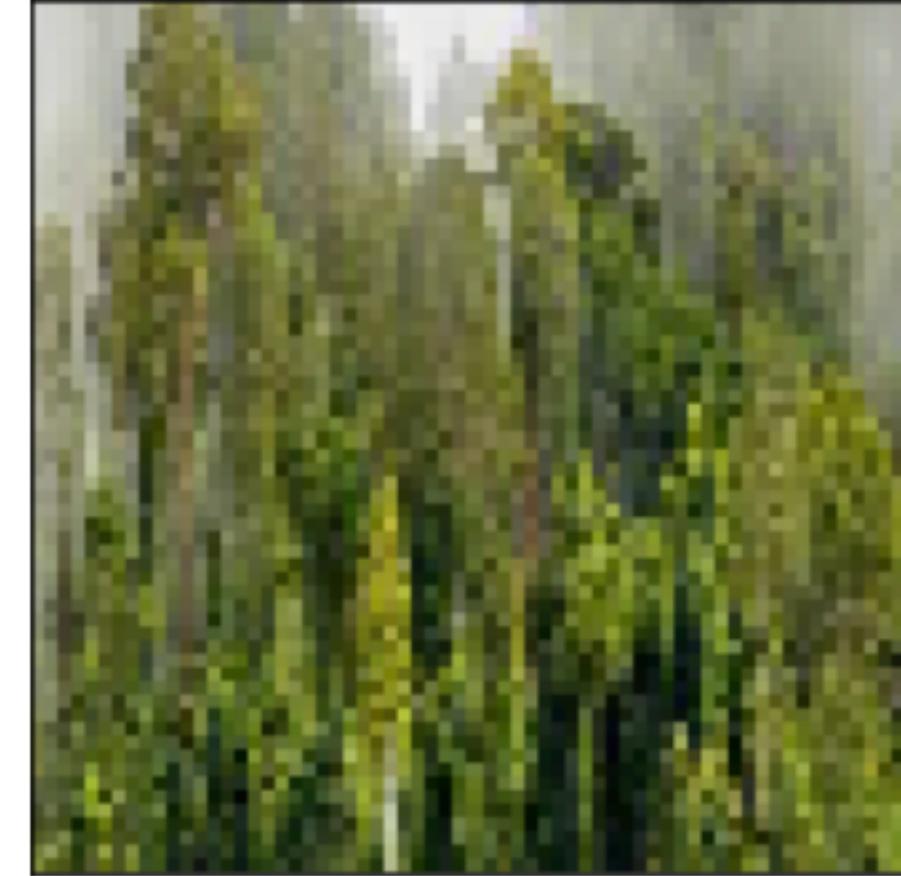
Simple Model



Adversarial Model



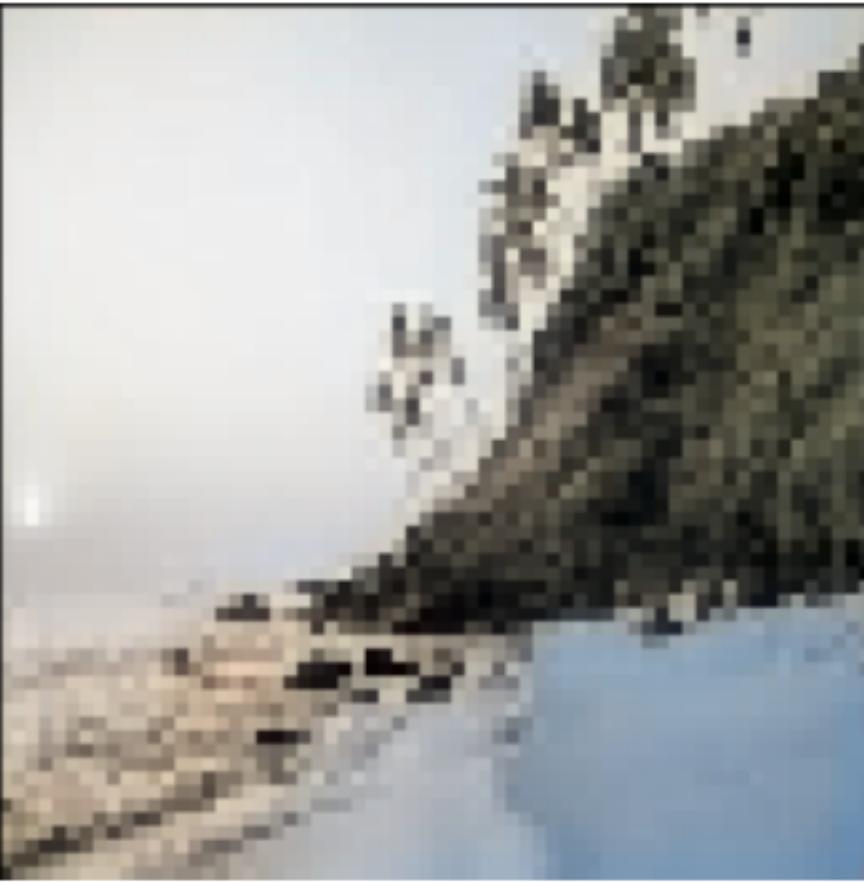
Original Image



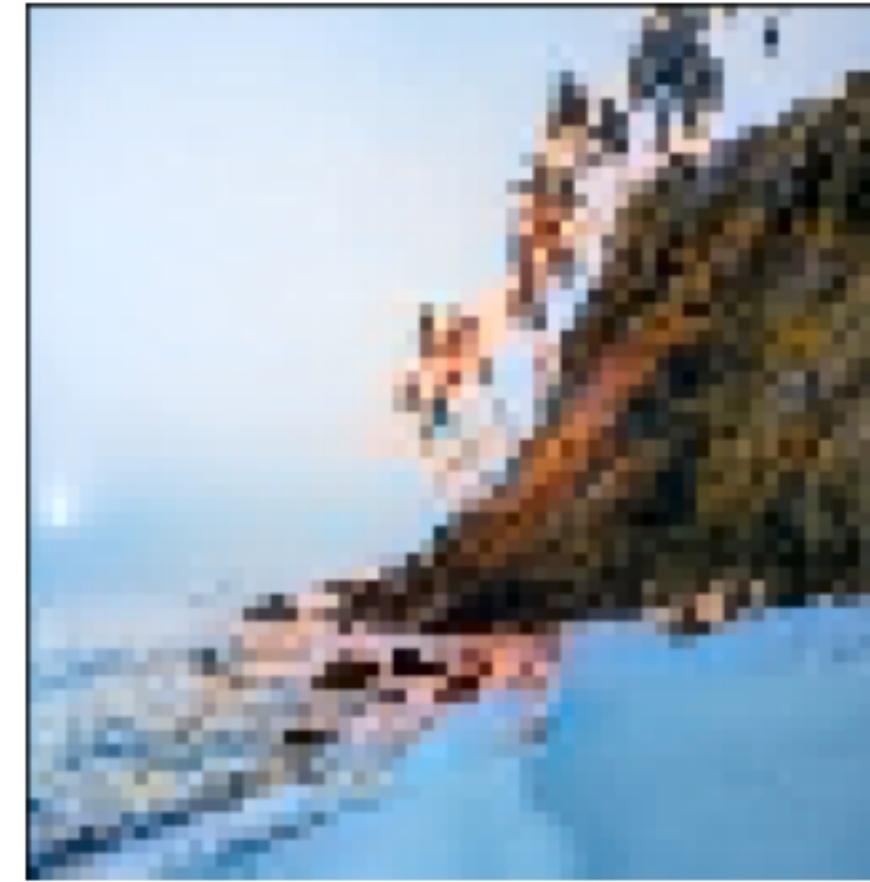
Gray Input



Simple Model



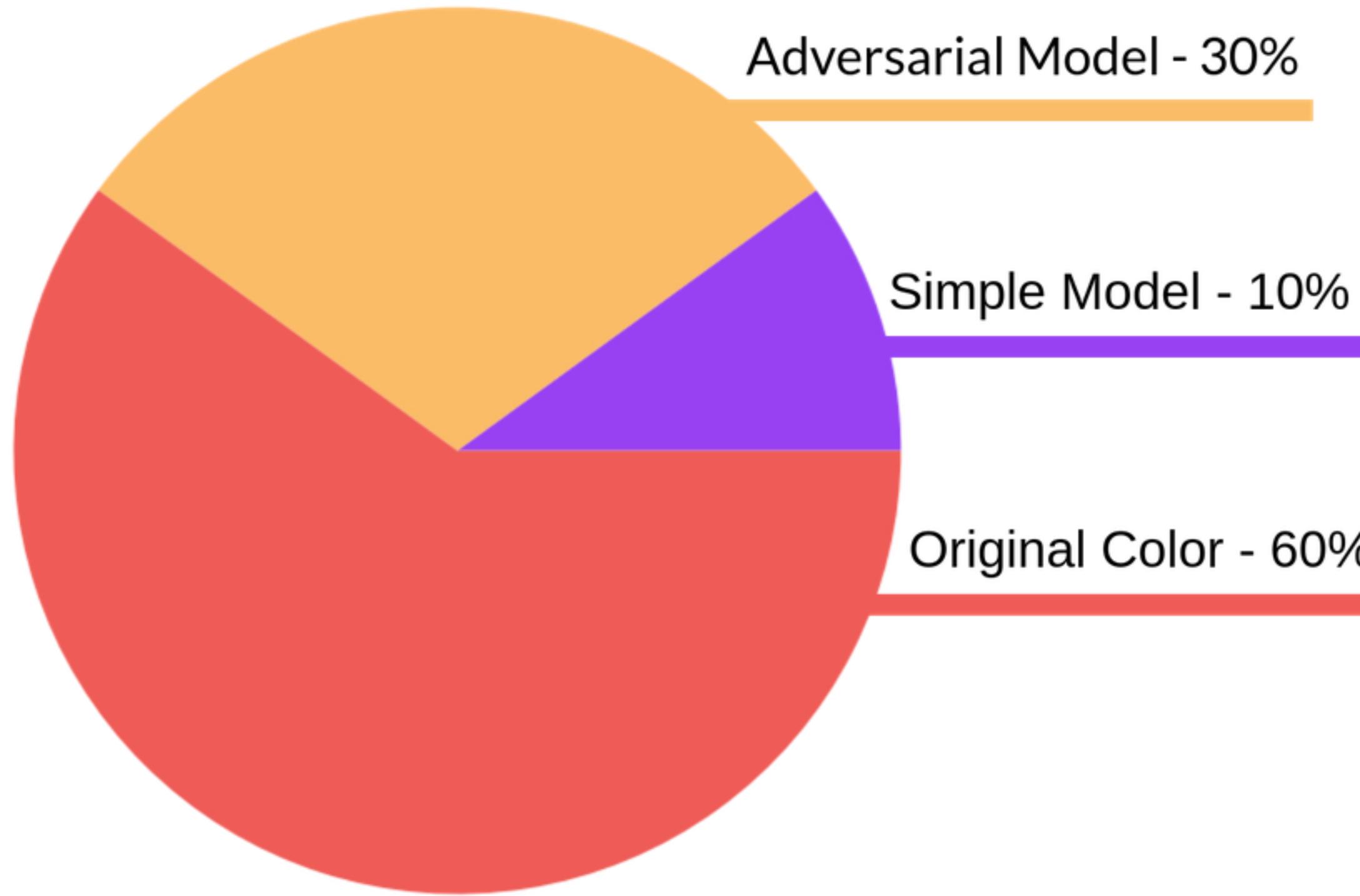
Adversarial Model



Original Image



10 Respondents Shown 16 Image Sets





**Respondents Preferred the
Adversarial Model to the
Simple Model**





Videos

Sequences of Images

...with some extra constraints



Consistency

Are the videos choppy or flashing?

Do colors follow objects well?





Dareful Nature Collection

27 Short Videos

1,200 Frames

Reduced in Size

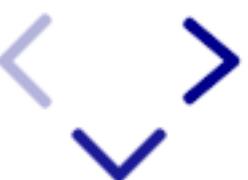
Flipped and Rotated for Variety



Example Frames



Results



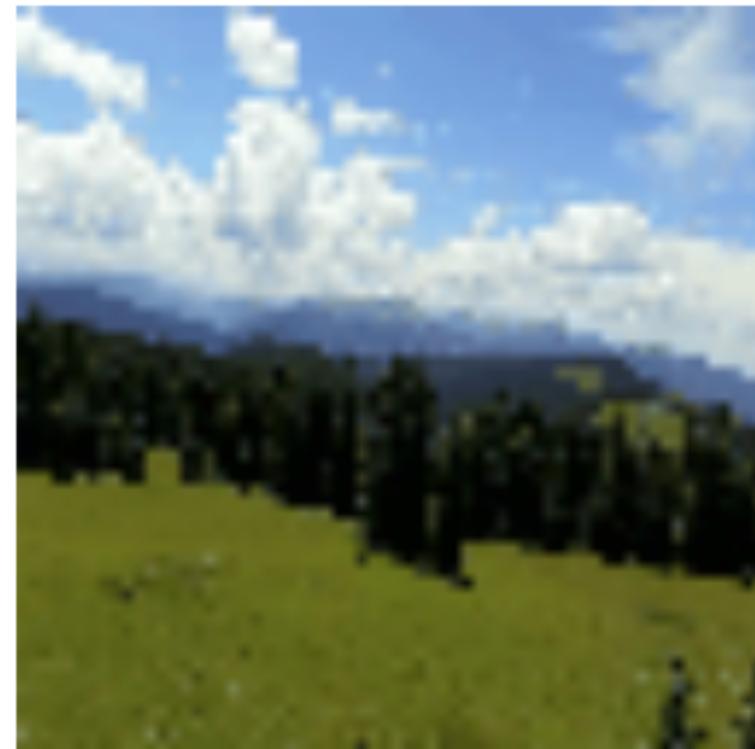
Gray Input



Model Colorized



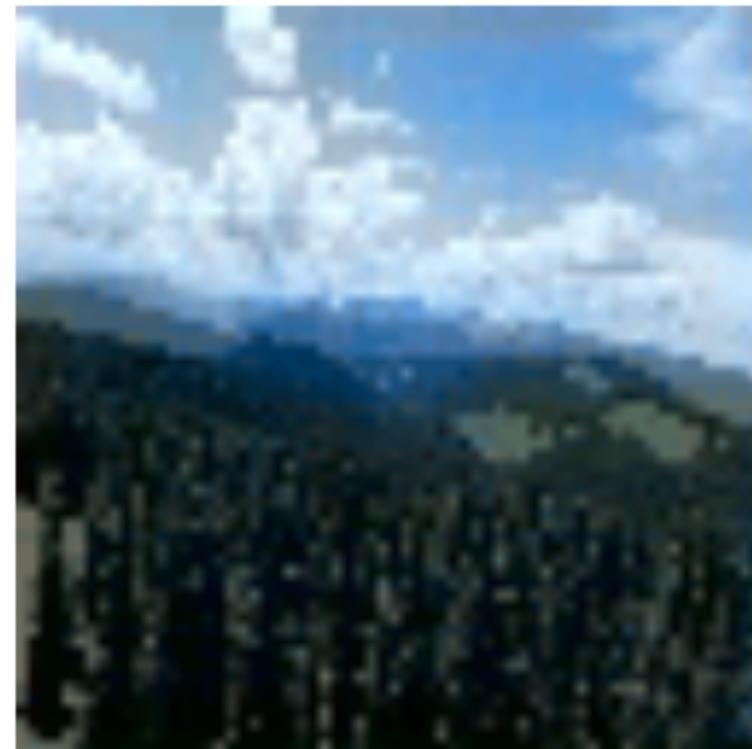
Original Video



Gray Input



Model Colorized



Original Video



Gray Input



Model Colorized



Original Video



Gray Input Model Colorized Original Video



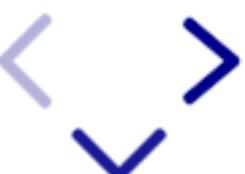


Respondents
Overwhelmingly Preferred
the Original Colors



Model Improvements

Provide **Context** with Images





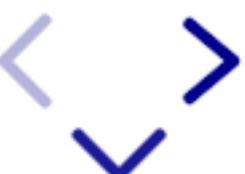
Video Model Improvements

Consider Previous Frames



Recommendations

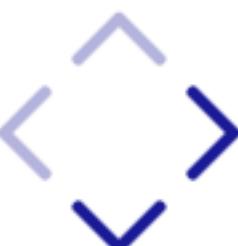
Make Partnerships and
Acquire Training Data





Recommendations

Iterate and Improve
on Adversarial Model





Recommendations

**Kickstart Existing Process
Using Adversarial Model**





Thank you!

Do you have any Questions?

Project Repo.



Credits

Datasets

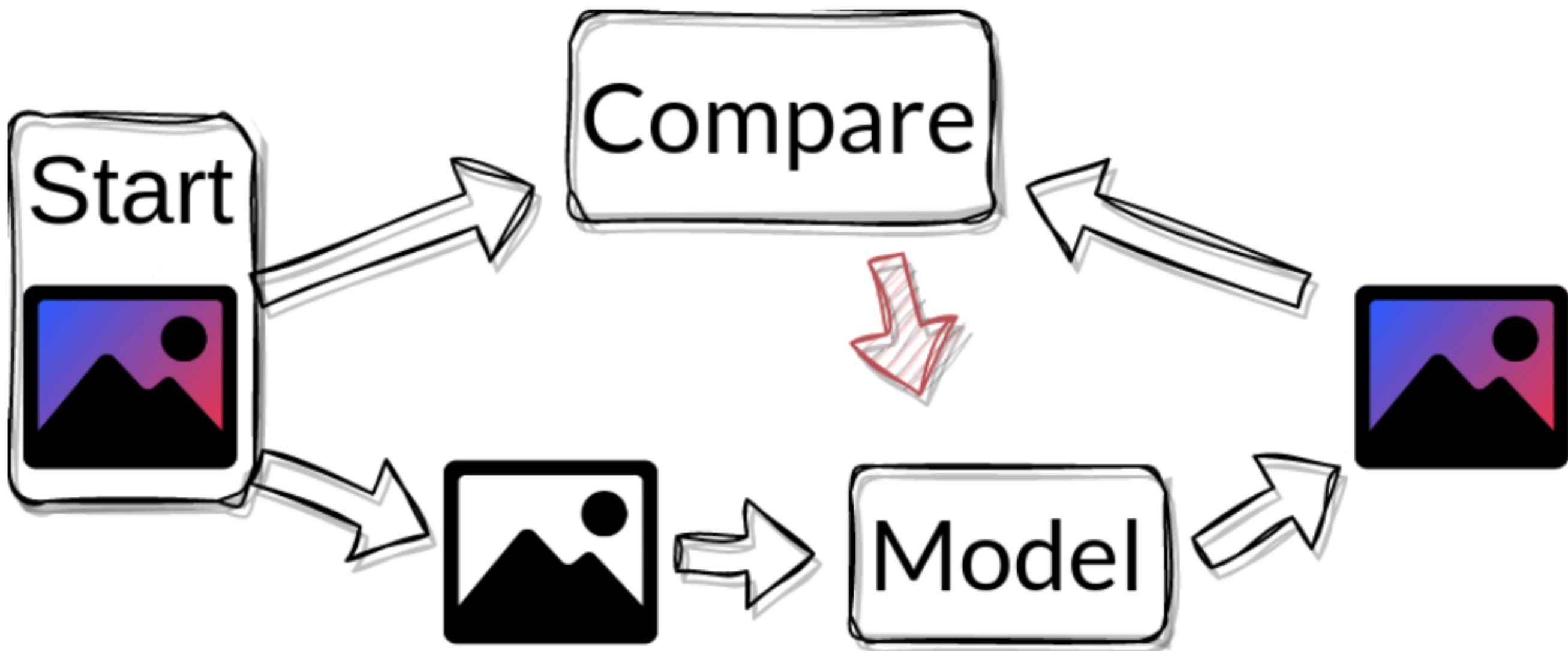
- [Landscape Recognition | Image Dataset | 12k Images](#)
- [Dareful Nature Collection](#)

Icons

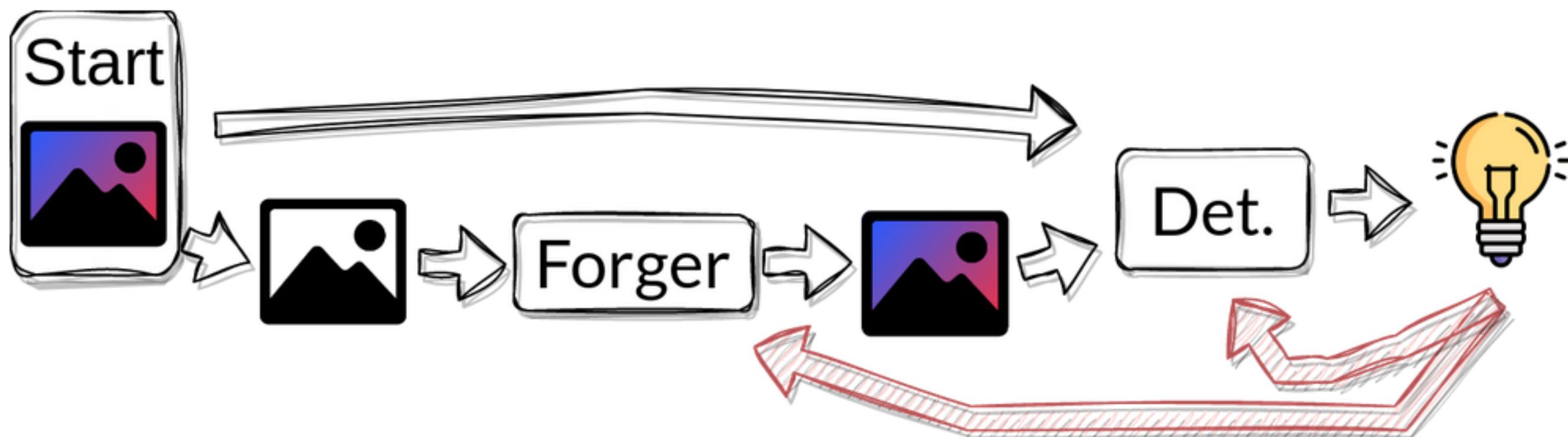
- [Bento icons created by Freepik - Flaticon](#)
- [Art icons created by Freepik - Flaticon](#)
- [Cars icons created by BZZRINCANTATION - Flaticon](#)
- [Tree icons created by Freepik - Flaticon](#)
- [Photo icons created by Freepik - Flaticon](#)
- [Repeat icons created by Freepik - Flaticon](#)
- [Cloud icons created by kosonicon - Flaticon](#)
- [Idea icons created by Freepik - Flaticon](#)



Training Simple Model



Training Adversarial Model



Near-Duplicate Frames



LAB Color Space

Alternative to RGB

L Contains Grayscale Image

Only Need to Predict Two Channels