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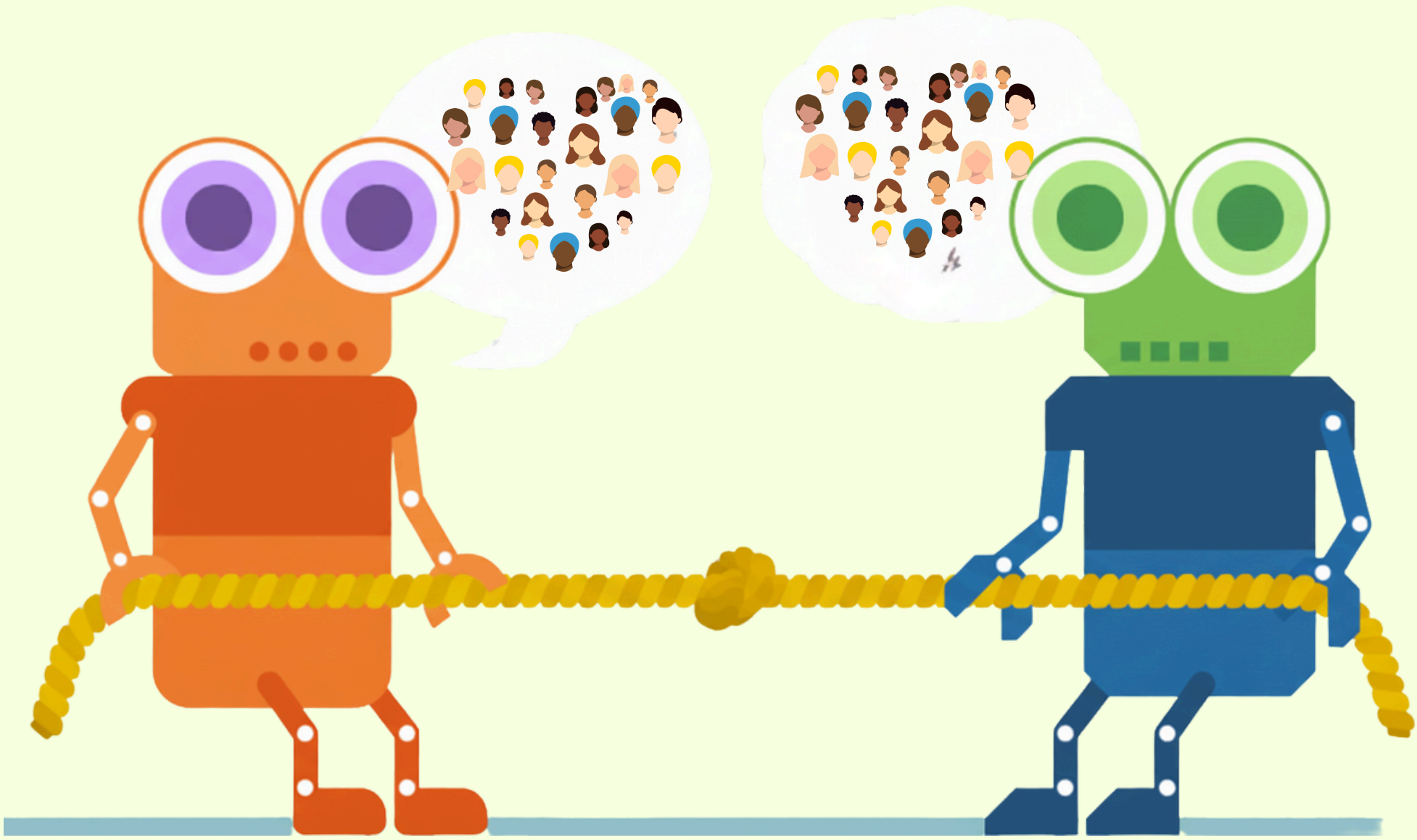
Generative Adversarial Network

An AI that learns to create realistic data through competition



Generator (Artist) **Discriminator (Critic)**

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What is GAN?

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A smart AI model that **creates new data like images, videos or music** that looks real!

GAN has two parts:

(Like a forger)

Generator

(Creates fake data)

Discriminator

(Checks if it's real or fake)

(Like a detective)

They keep competing, until the generator gets so good that **even the detective can't tell the difference**!

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Example:

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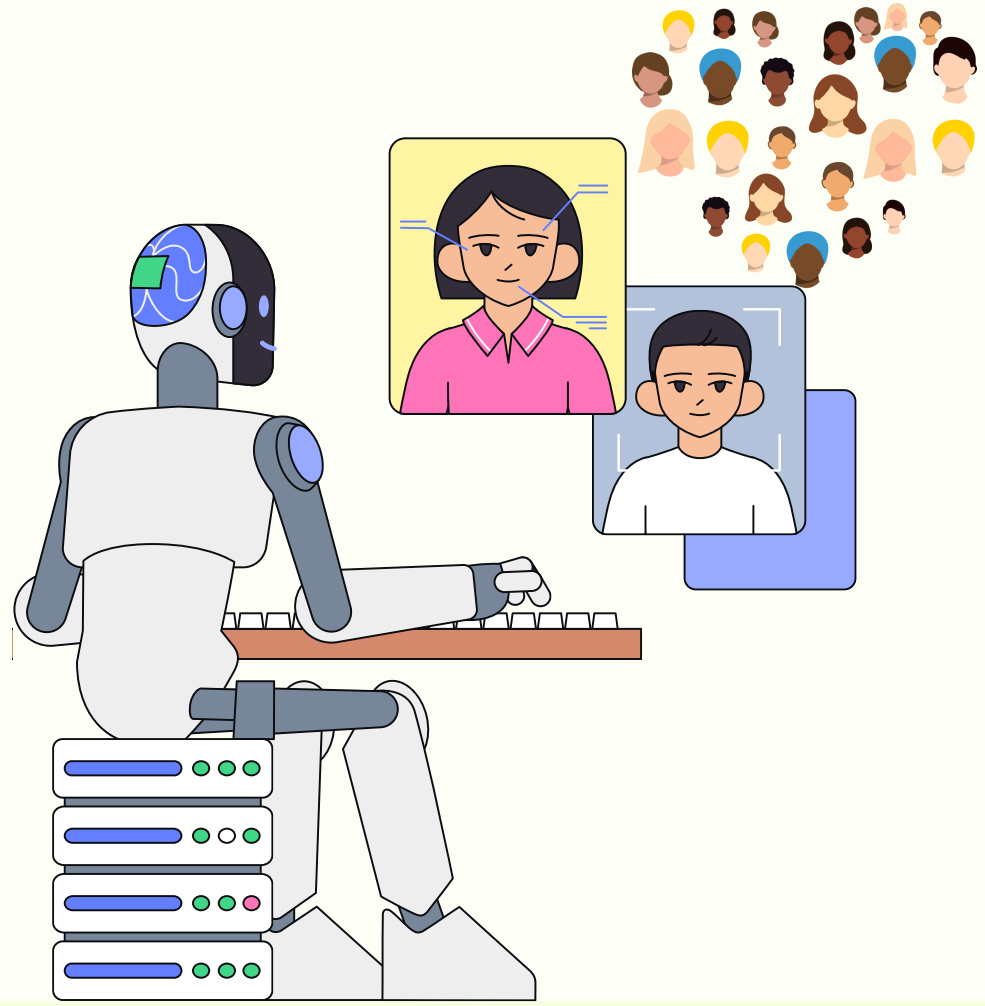
- You show **GAN thousands of real human faces**. Then ask it to create a new face.

- GAN **generates a face** that looks so realistic, but it doesn't belong to any actual person!



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How GAN Works?

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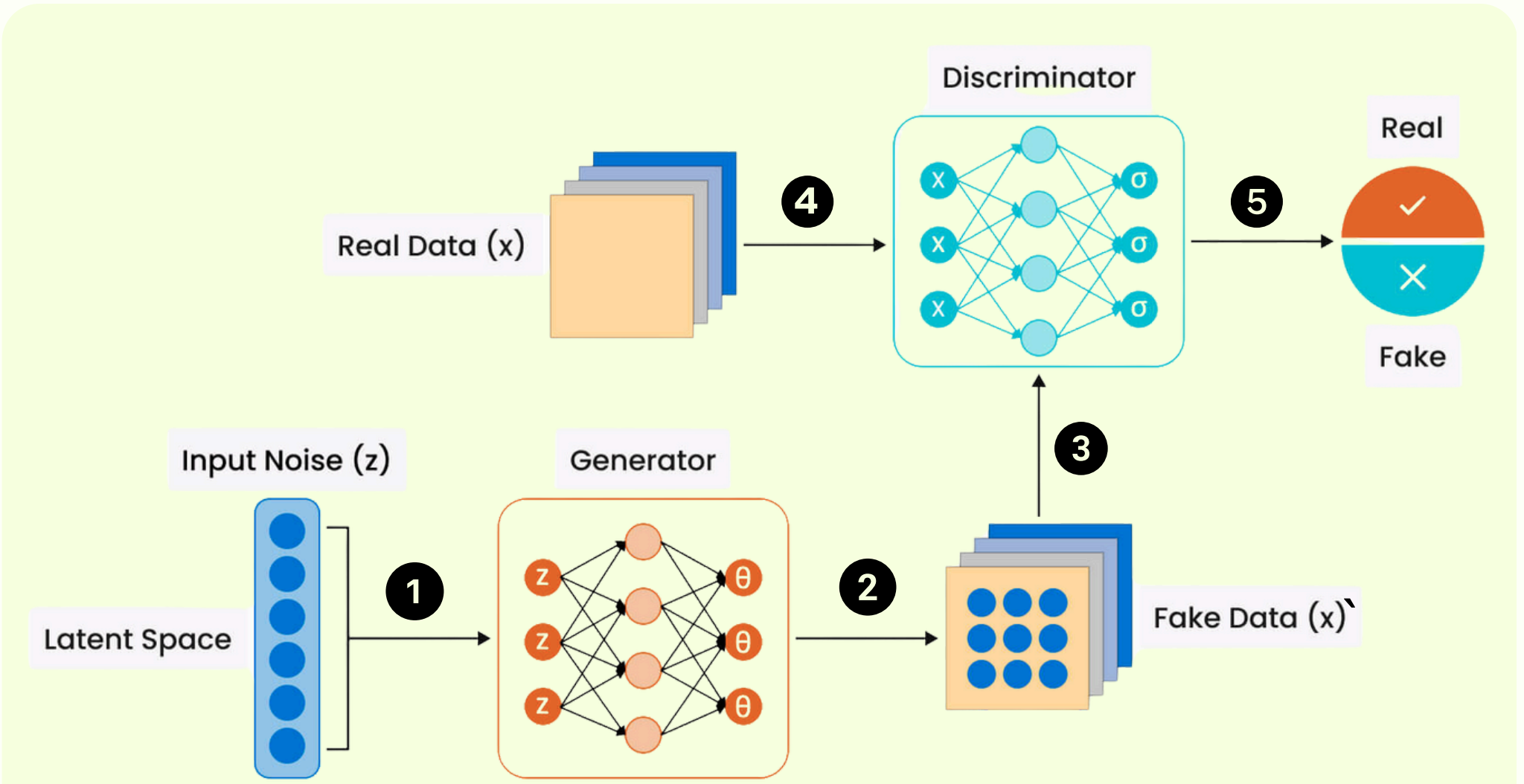

Image source: www.solulab.com/generative-adversarial-network/

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Workflow Explained:

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Step 1: Input Noise (z) – Latent Space

Process starts with random noise (z). This noise comes from a space called latent space.

Example: You give random numbers like 1, 4, 8 to the system.

Step 2: Generator

The Generator takes this random noise and **creates fake data** that looks real.

Example: If the goal is to generate human faces, it turns random numbers into a fake human face image.

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Step 3: Fake Data

The fake output (x') is produced by the Generator.

Example: A generated image of a face that doesn't exist in real life.

Step 4: Discriminator

It receives both:

Real Data (x) (from real examples)

Fake Data (x') (from the Generator)

The Discriminator **acts like a judge**. Its job is to decide whether the data is real or fake.

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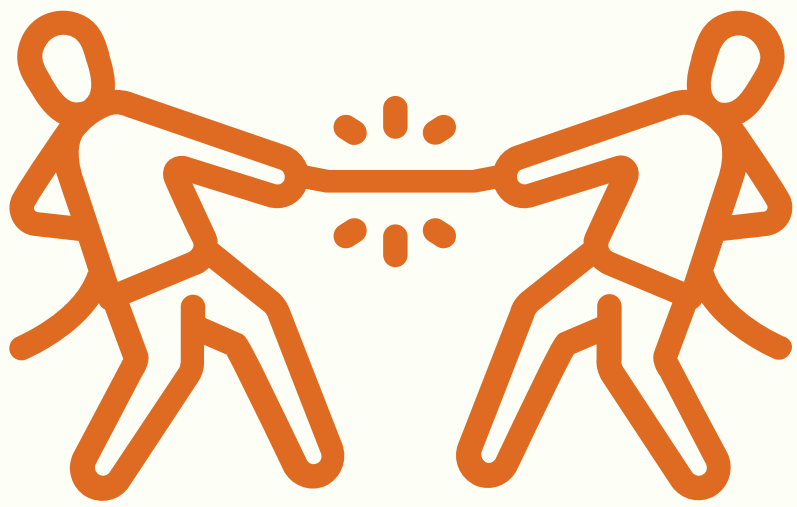
Training (Adversarial Process):

The Generator and Discriminator compete with each other:

- ✓ The Generator tries to fool the Discriminator by making fake data look real.
- ✓ The Discriminator tries to catch the fake data correctly.

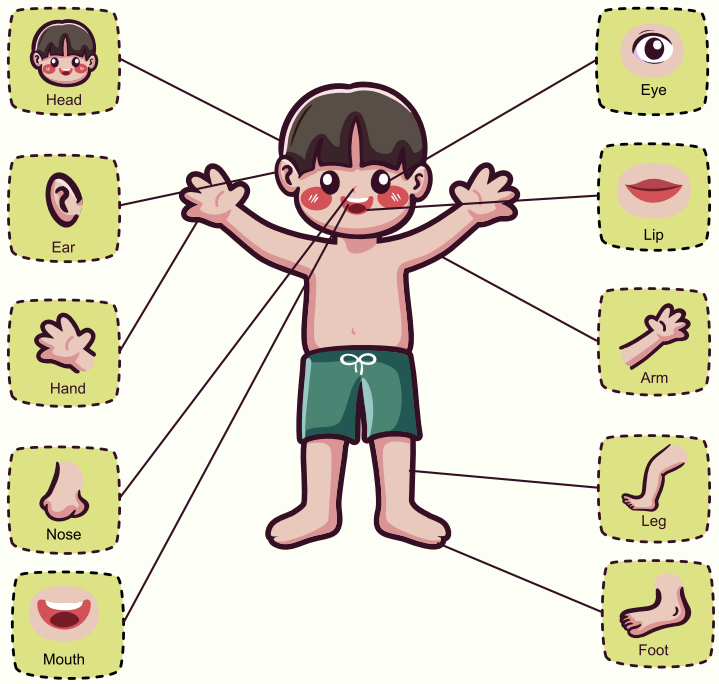
This back-and-forth process helps both models get better.



Step 5: Final Output

After many training rounds, the Generator creates data so realistic that the Discriminator can hardly tell it's fake.

Example: The Generator can now make faces that look perfectly real.



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