

“Machine” “Learning”

Ye Olde Code

```
function addNumbers(a, b, c) {  
    return a + b + c;  
}
```

New Hotness

```
function addNumbers(a, b, c) {  
    return ???;  
}
```

addNumbers(3, 4, 5)	->	12
addNumbers(1, 2, 3)	->	6
addNumbers(2, 2, 3)	->	7
addNumbers(3, 2, 3)	->	8
addNumbers(3, 3, 3)	->	9
addNumbers(7, 1, 4)	->	12
addNumbers(9, 1, 7)	->	17
addNumbers(6, 4, 4)	->	14
addNumbers(4, 1, 5)	->	10
addNumbers(6, 4, 6)	->	14
addNumbers(3, 1, 3)	->	7

ImageNet Large-Scale Visual Recognition Challenge

Object detection

Easiest classes

butterfly (93)



dog (84)



volleyball (83)



rabbit (83)



frog (82)



basketball (80)



snowplow (80)



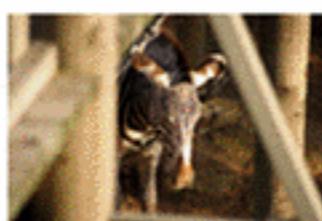
bird (78)



tiger (77)



zebra (77)



Hardest classes

lamp (15)



flute (15)



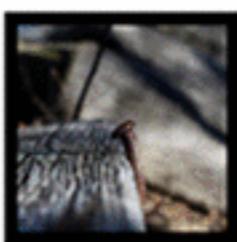
horizontal bar (14)



spatula (13)



nail (13)



ski (12)



microphone (11)



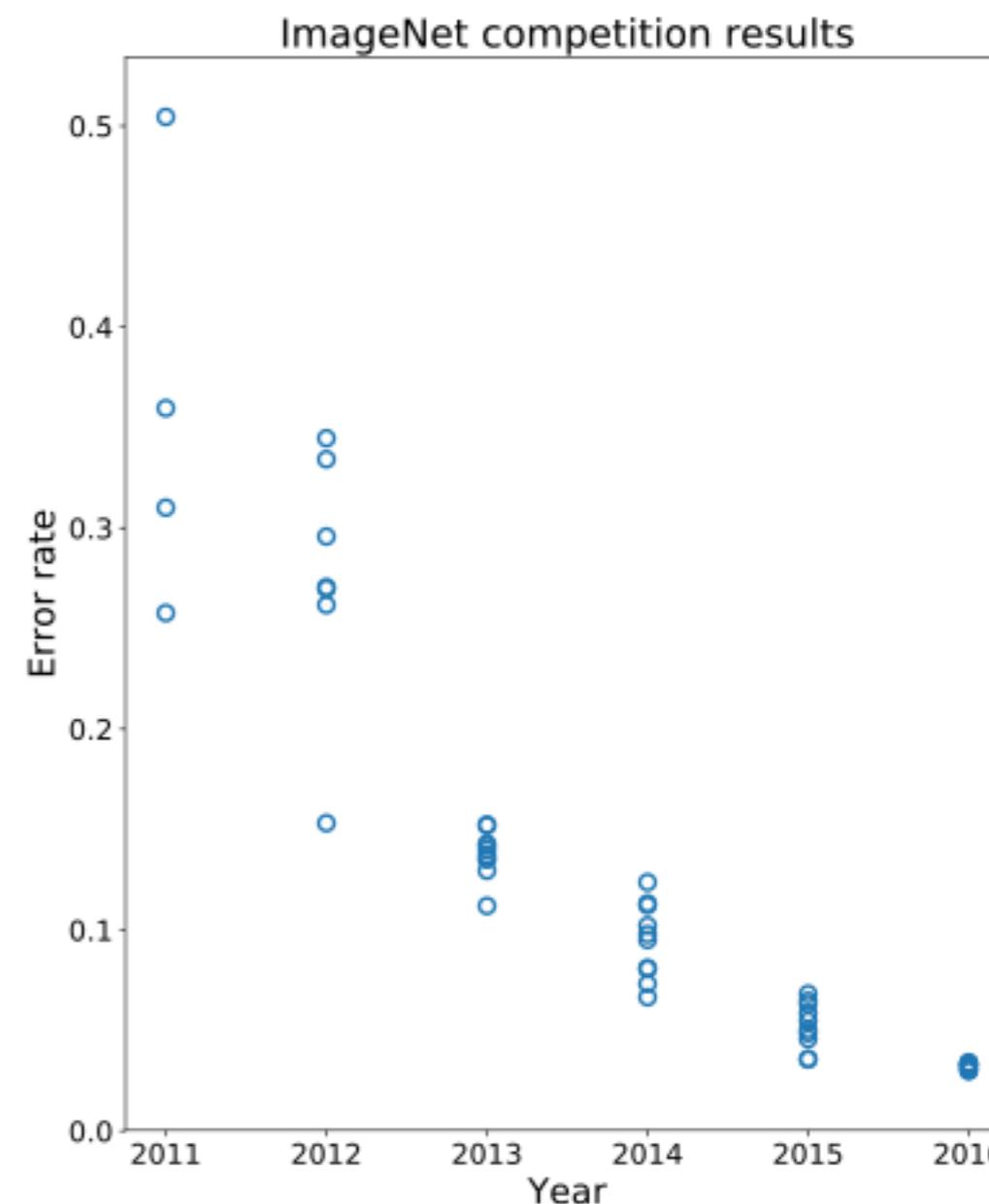
rubber eraser (10)



ladle (9)

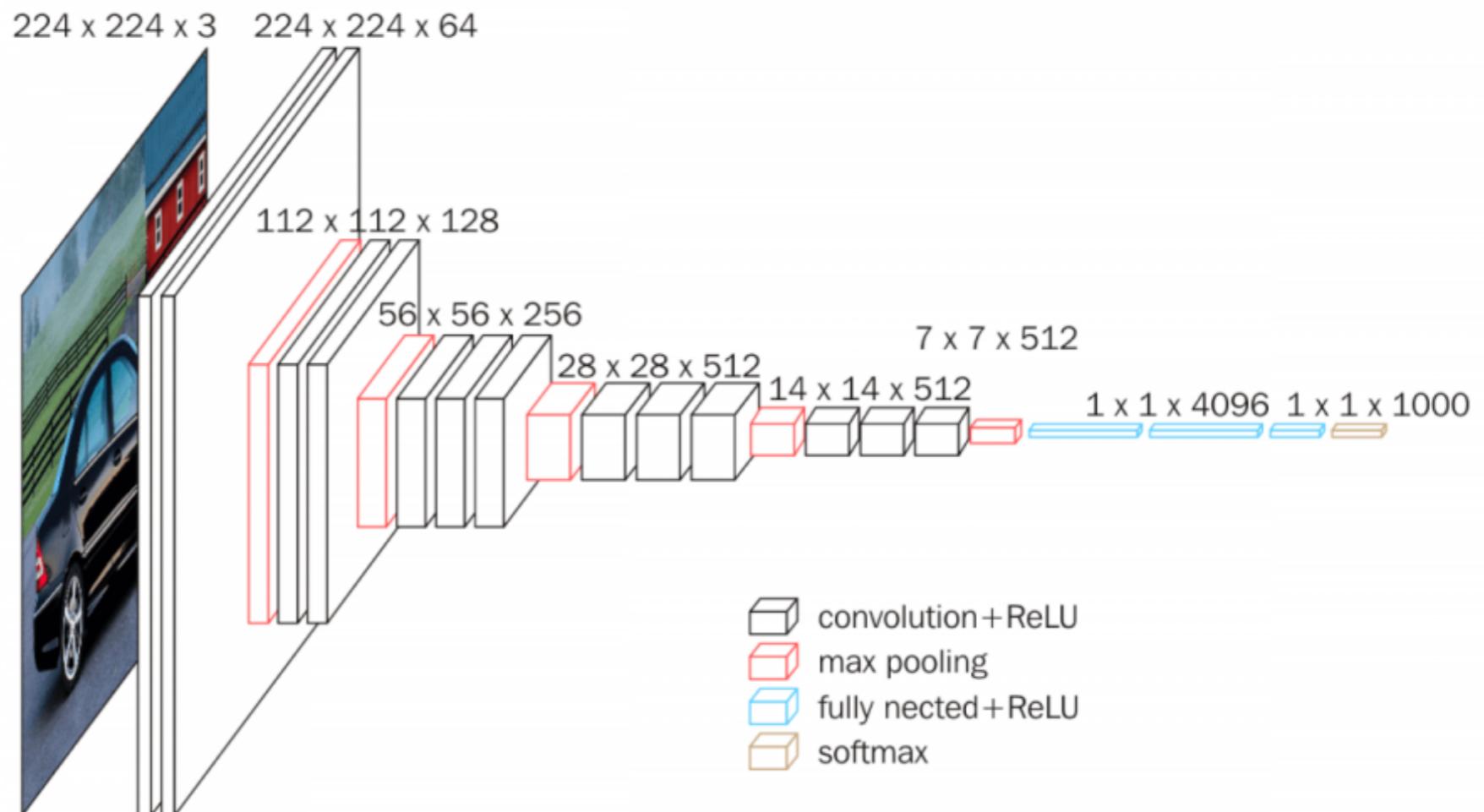


backpack (8)



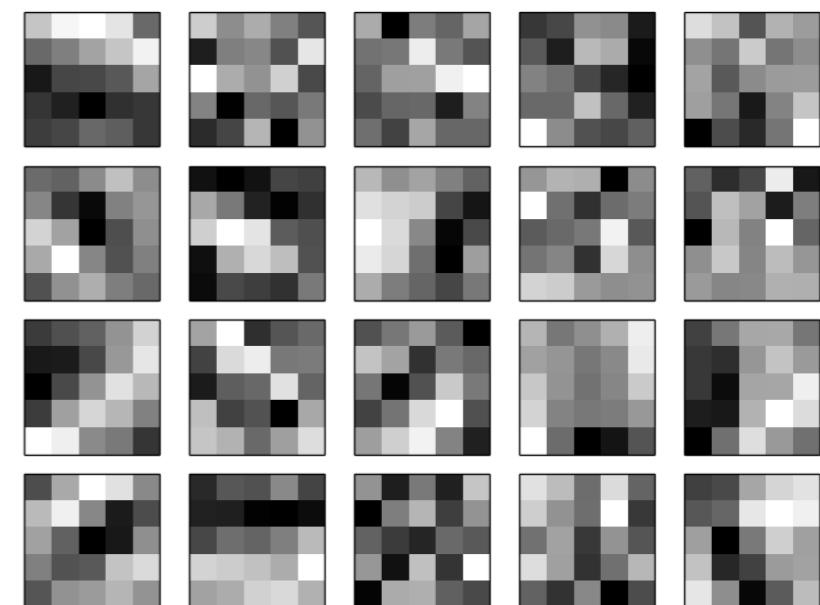
What? How?

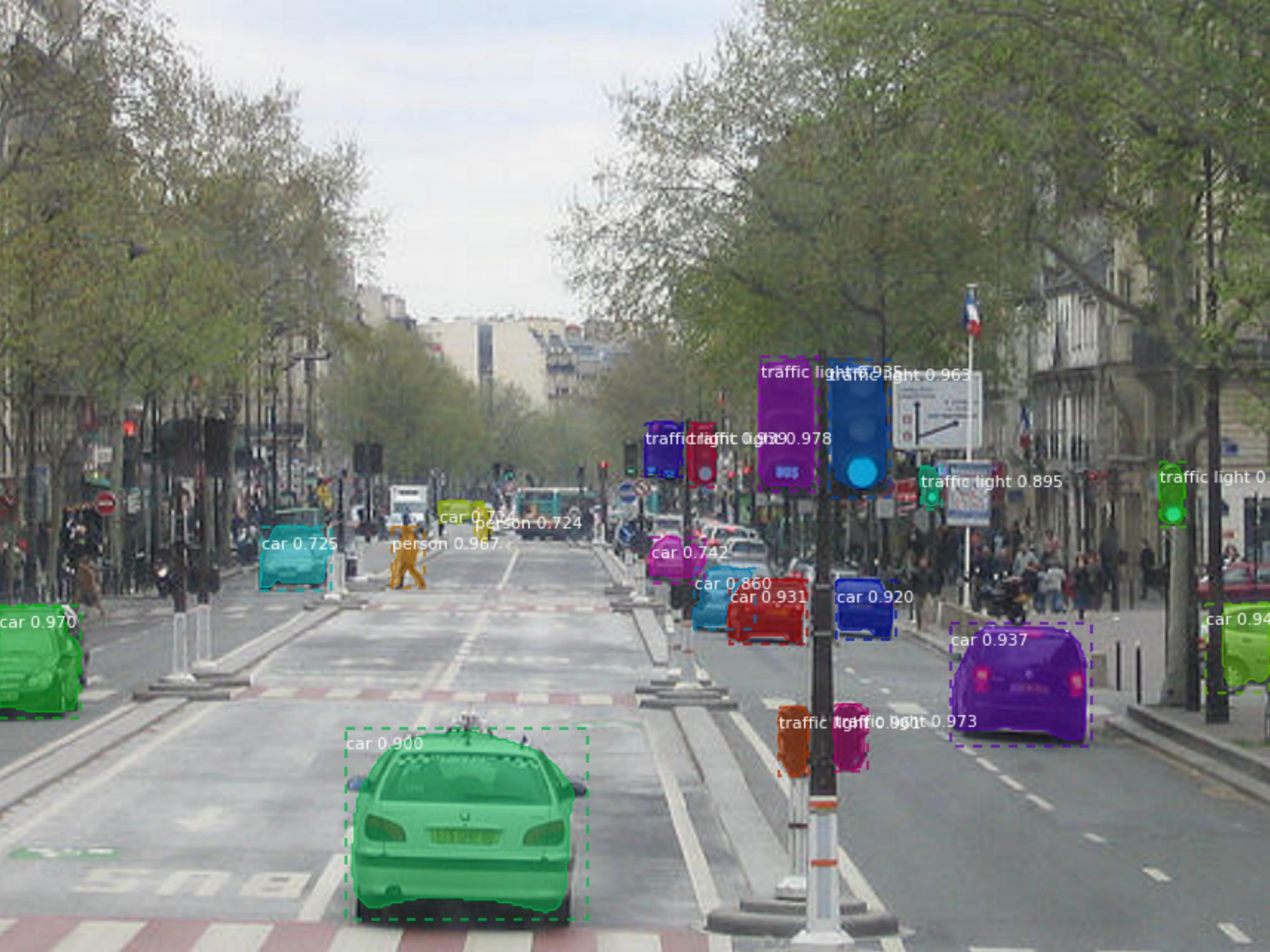
- 1000 categories
- 1.2 million
labeled images



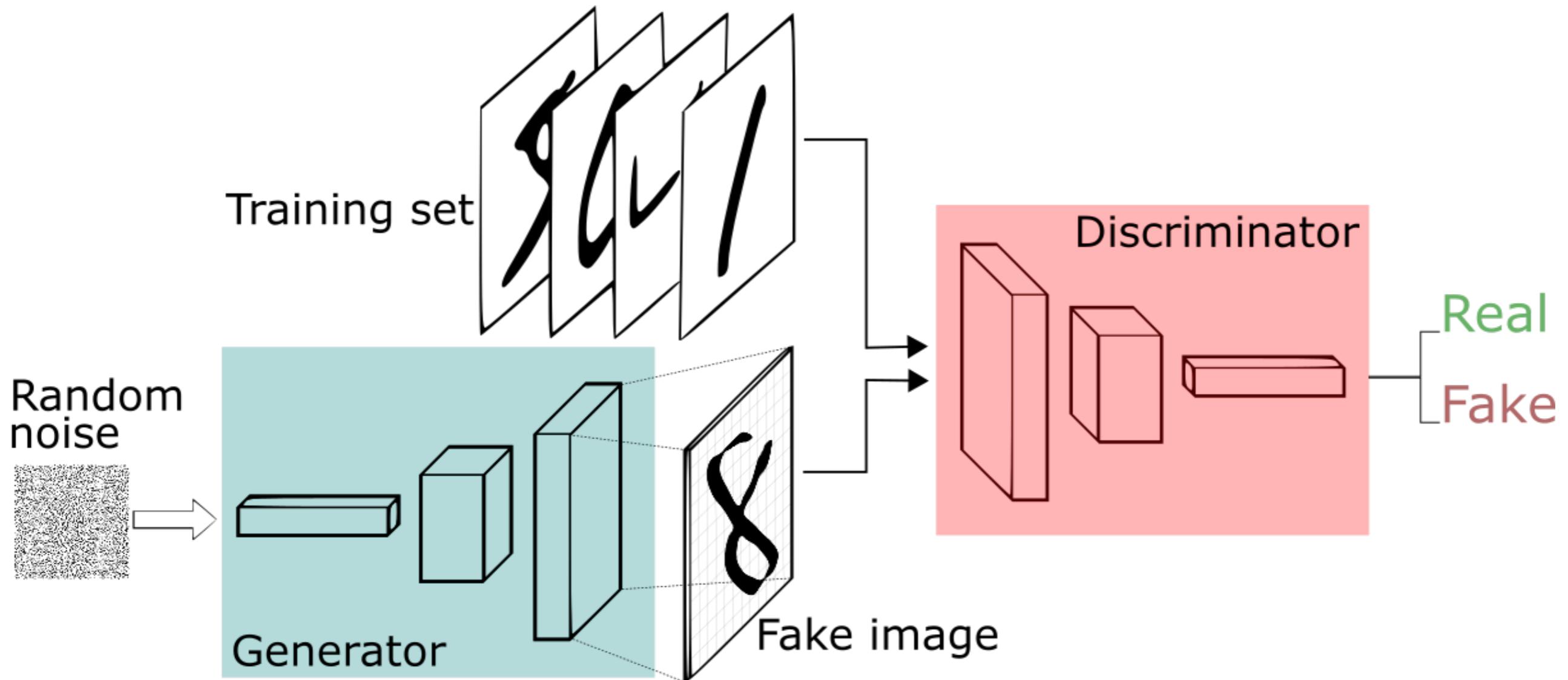
Simpler Version – MNIST

0	4	1	9	2	1	3	1	4	3
5	3	6	1	7	2	8	6	9	4
0	9	1	1	2	4	3	2	7	3
8	6	9	0	5	6	0	7	6	1
8	7	9	3	9	8	5	9	3	3
0	7	4	9	8	0	9	4	1	4
4	6	0	4	5	6	1	0	0	1
7	1	6	3	0	2	1	1	7	9
0	2	6	7	8	3	9	0	4	6
7	4	6	8	0	7	8	3	1	5



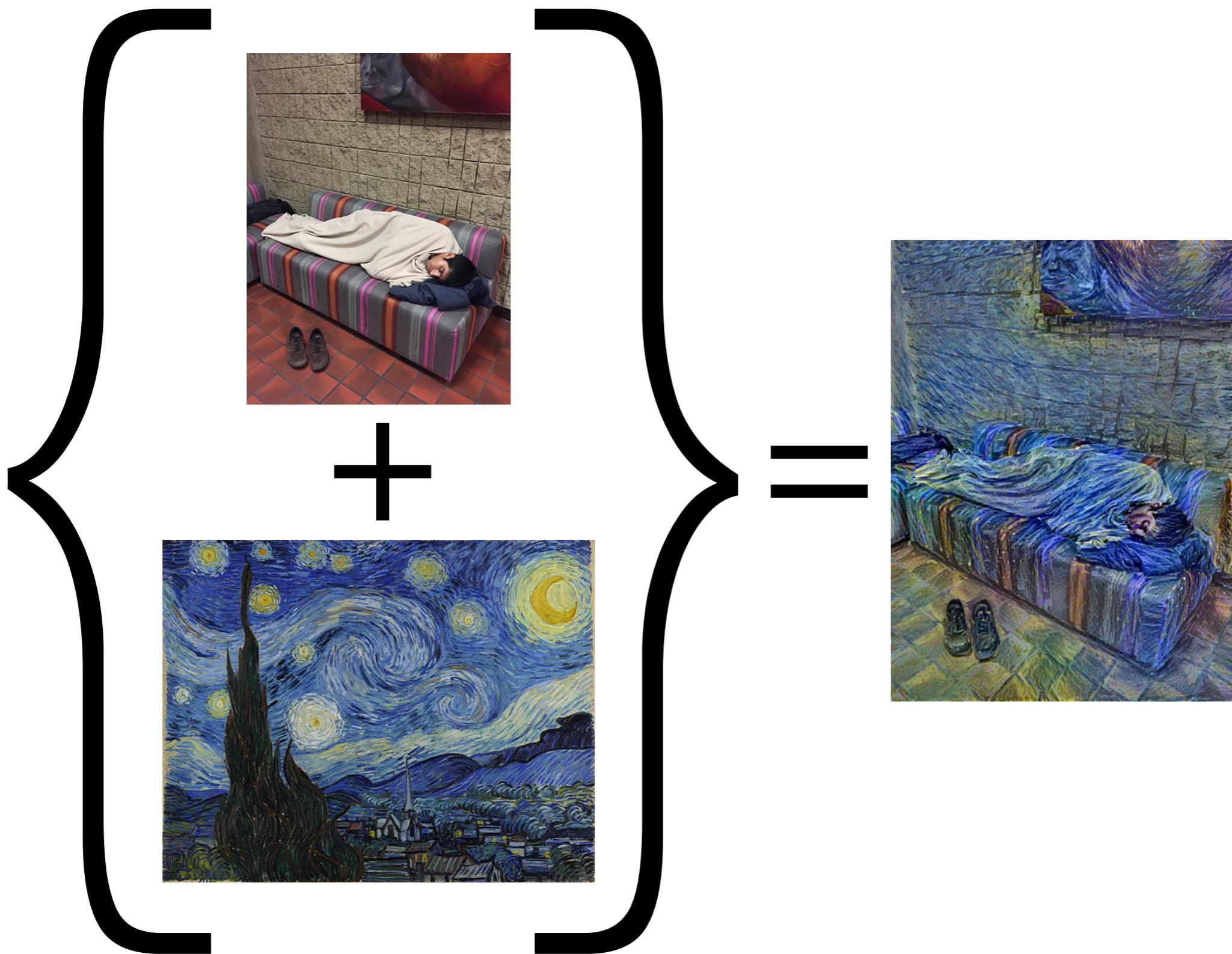


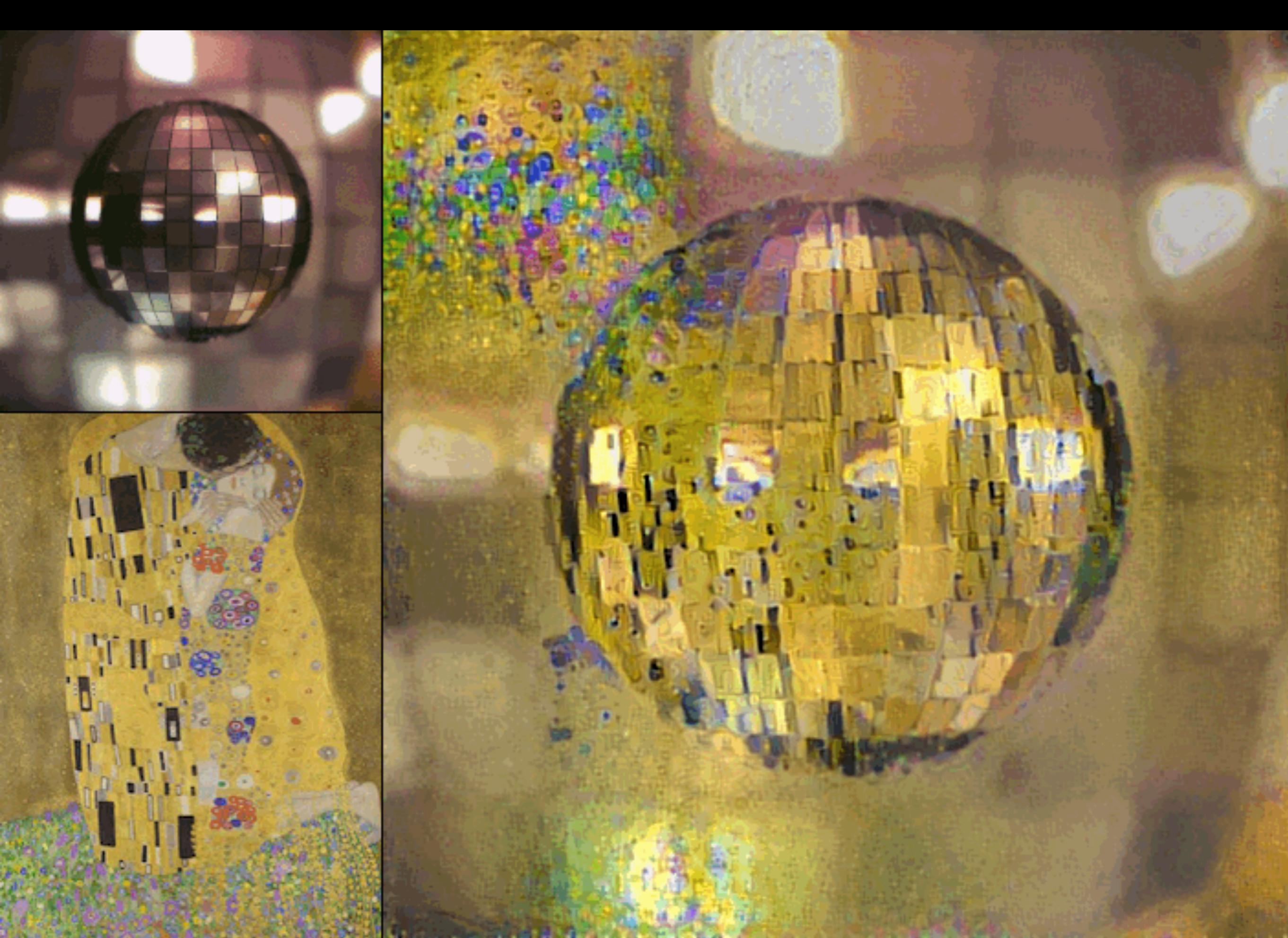
Generative Adversarial Networks (GANs)



Generative Adversarial Networks (GANs)







RNNs

- All the works of Shakespeare in a single (4.4MB) file.
- 3-layer RNN with 512 hidden nodes on each layer.
- After training for **a few hours** we obtain samples.

PANDARUS:

Alas, I think he shall be come approached and the day
When little strain would be attain'd into being never fed,
And who is but a chain and subjects of his death,
I should not sleep.

Second Senator:

They are away this miseries, produced upon my soul,
Breaking and strongly should be buried, when I perish
The earth and thoughts of many states.

DUKE VINCENTIO:

Well, your wit is in the care of side and that.

Second Lord:

They would be ruled after this chamber, and
my fair nues begun out of the fact, to be conveyed,
Whose noble souls I'll have the heart of the wars.

Clown:

Come, sir, I will make did behold your worship.

VIOLA:

I'll drink it.

```
/*
 * Increment the size file of the new incorrect UI_FILTER group information
 * of the size generatively.
 */
static int indicate_policy(void)
{
    int error;
    if (fd == MARN_EPT) {
        /*
         * The kernel blank will coeld it to userspace.
         */
        if (ss->segment < mem_total)
            unblock_graph_and_set_blocked();
        else
            ret = 1;
        goto bail;
    }
    segaddr = in_SB(in.addr);
    selector = seg / 16;
    setup_works = true;
    for (i = 0; i < blocks; i++) {
        seq = buf[i++];
        bpf = bd->bd.next + i * search;
        if (fd) {
            current = blocked;
        }
    }
    rw->name = "Getjbbregs";
    bprm_self_clearl(&iv->version);
    regs->new = blocks[(BPF_STATS << info->historidac)] | PFMR_CLOBATHINC_SECONDS << 12;
    return segtable;
}
```

Other Examples

- GPT-2: <https://openai.com/blog/better-language-models/>

Getting Hands-On

- Paperspace's Gradient 0
- ml5.js
- Google's Project Magenta