Computer Vision

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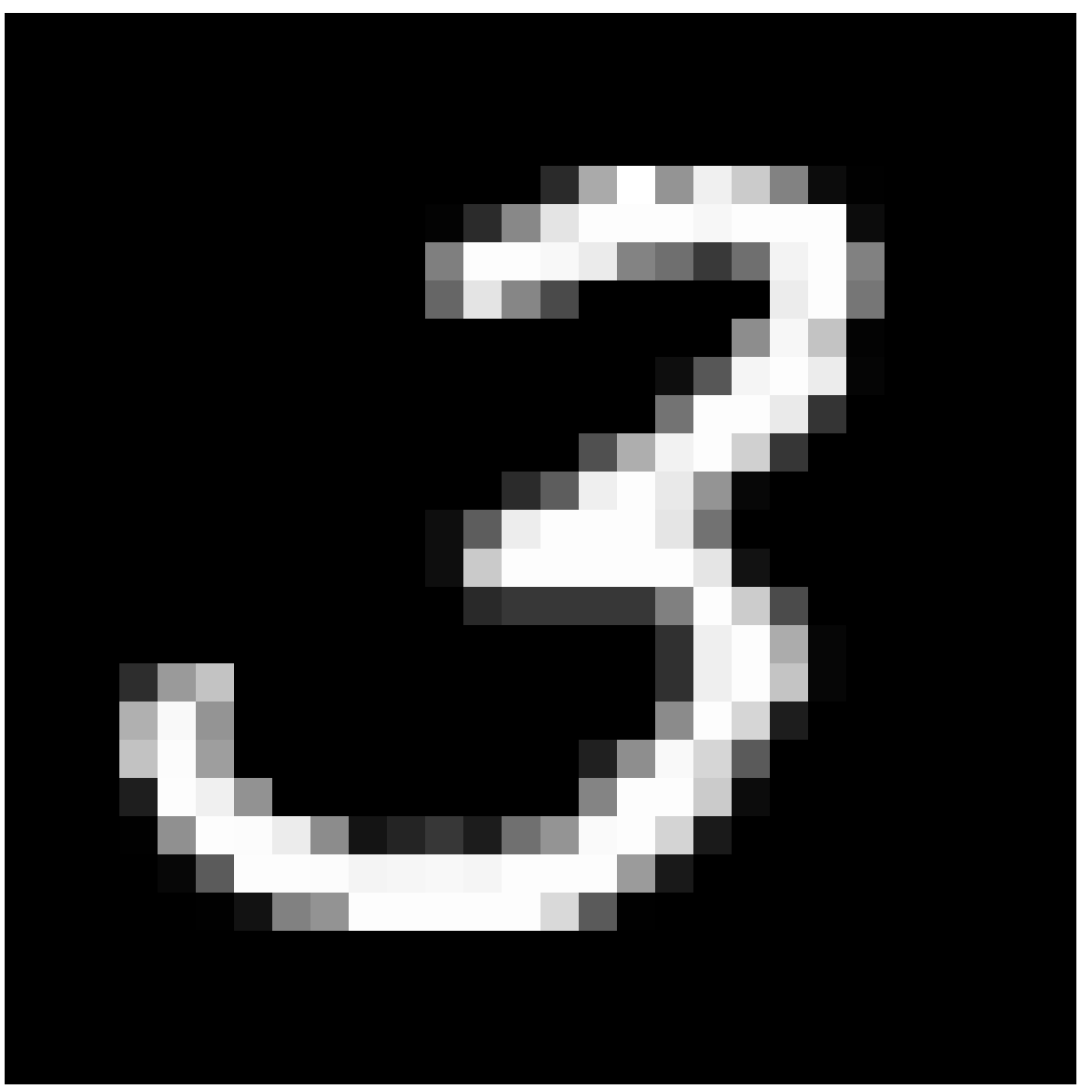
Daftar isi

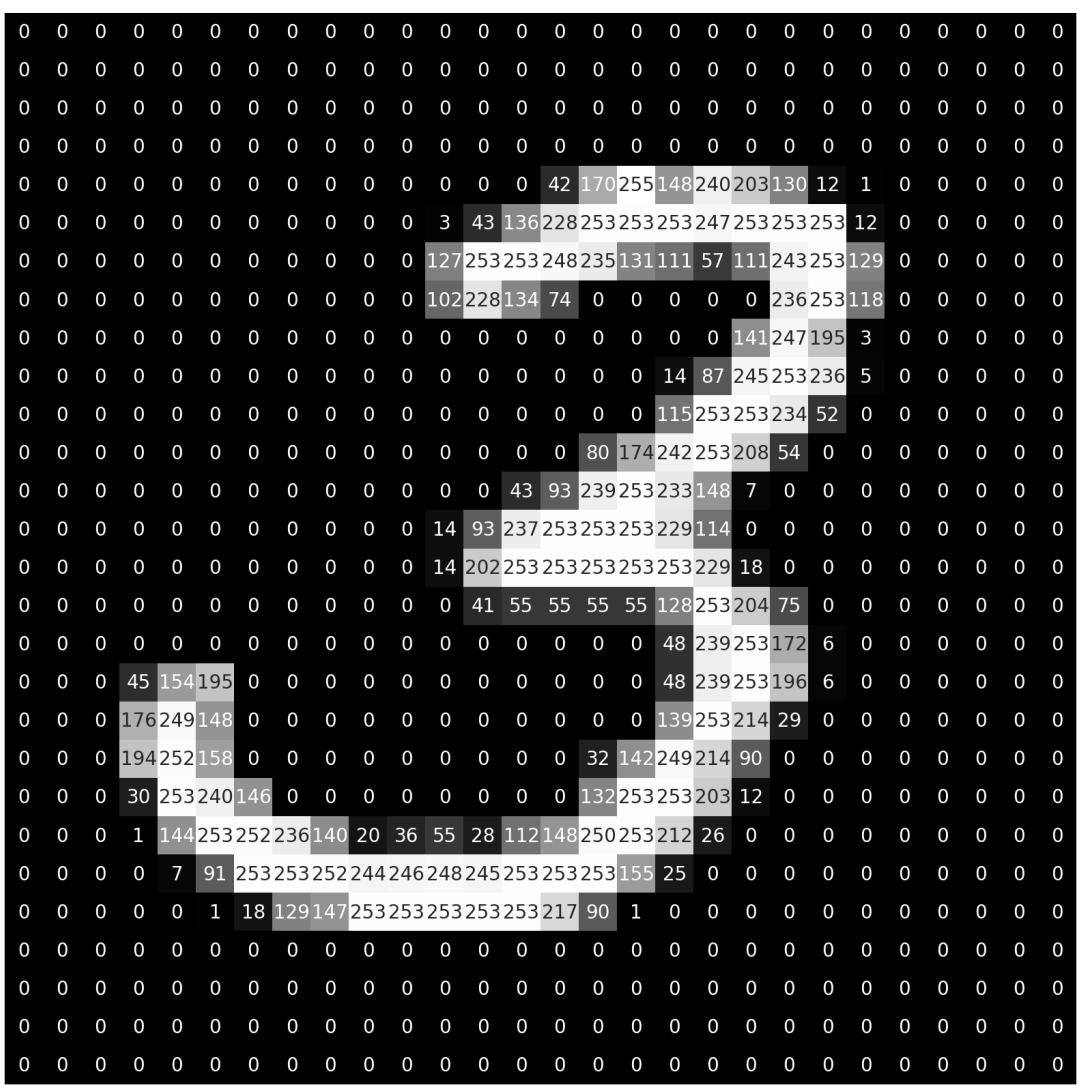
Computer Vision

Apa itu computer vision?

Angka berapa?



Angka berapa?



“Menjembatani piksel dan makna”

Tugas-tugas dalam Computer Vision

Kategori Tugas dalam Computer Vision

1. Pixels: convolutions, edges, descriptors
2. Segments: resizing, segmentation, clustering
3. Images: recognition, detection
4. Videos: motion, tracking

Image Restoration

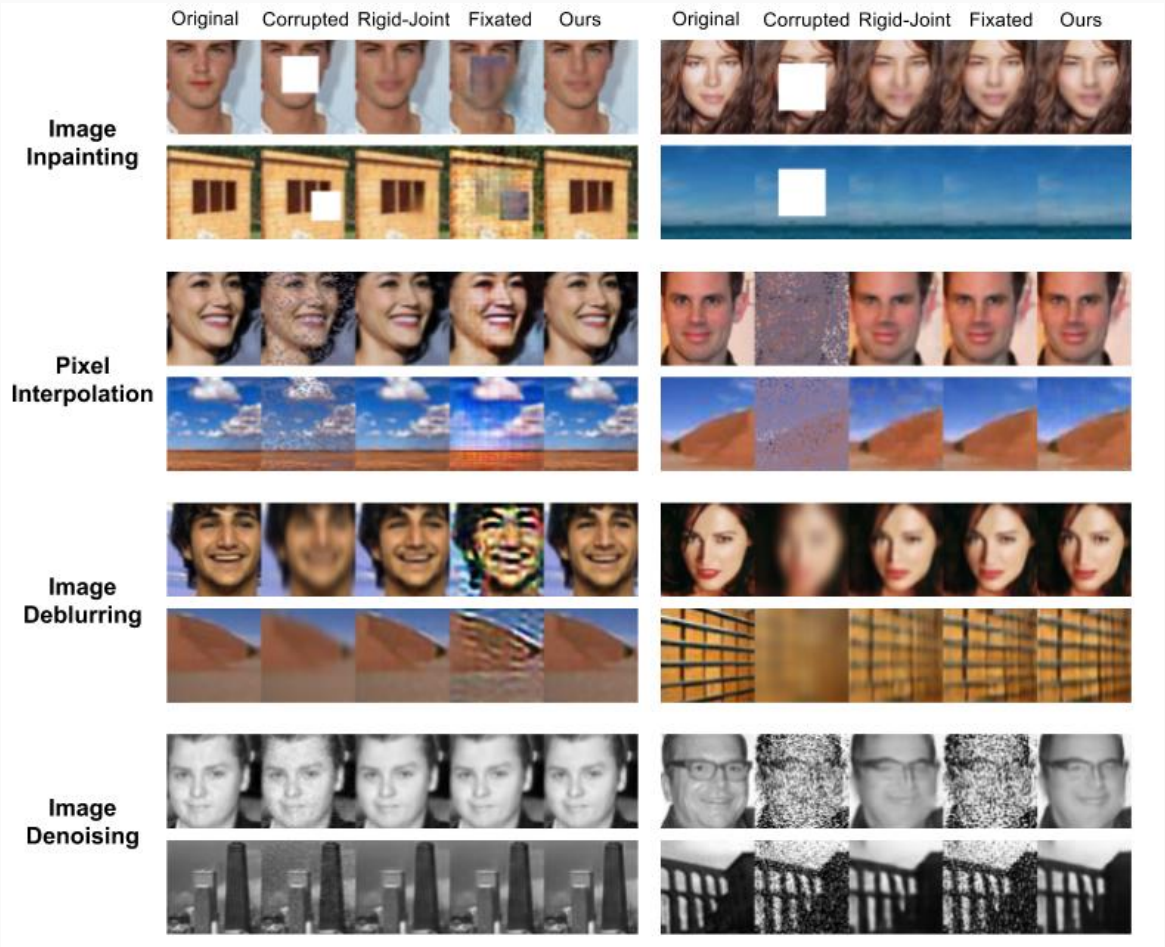


Figure 1: Beberapa tugas restorasi citra (Gao and Grauman, 2017)

Super-resolution

Figure 2: PULSE: Self-supervised photo upsampling (Menon et al., 2020)

Compression

Figure 3: Kompresi dari 16 juta warna menjadi 16 warna (VanderPlas, 2016)

Segmentation

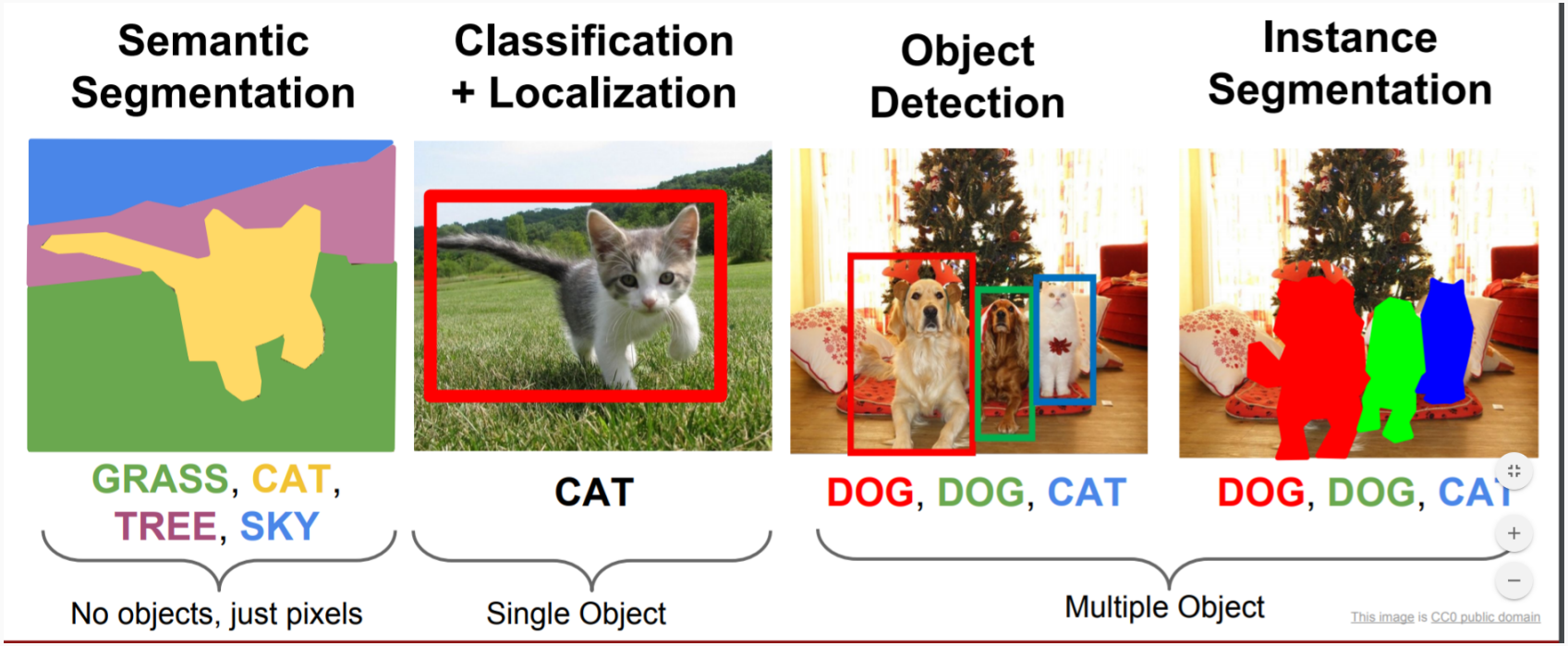


Figure 4: Deteksi vs segmentasi (Data Flair, 2020)

Image Classification

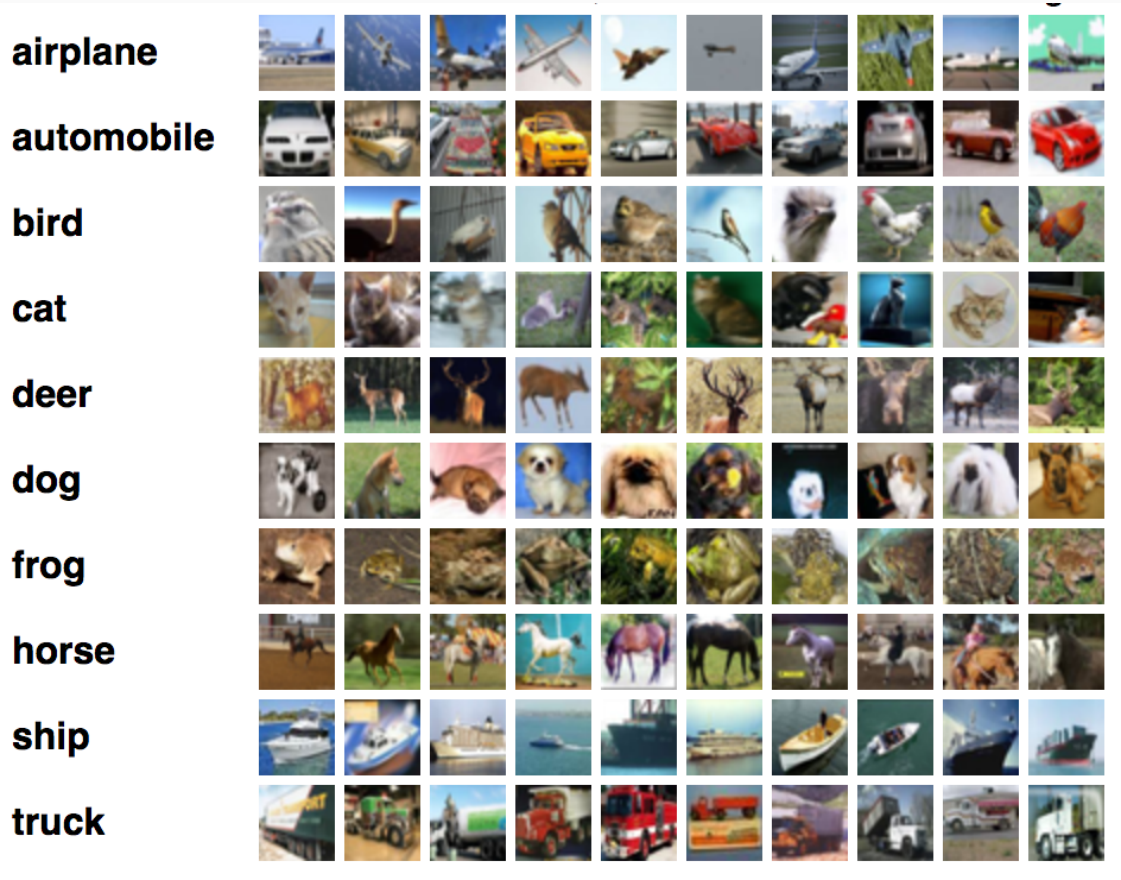


Figure 5: CIFAR-10 - 10 kelas dari gambar berukuran 32x32 piksel (Krizhevsky, 2009)

Image Classification - Healthcare

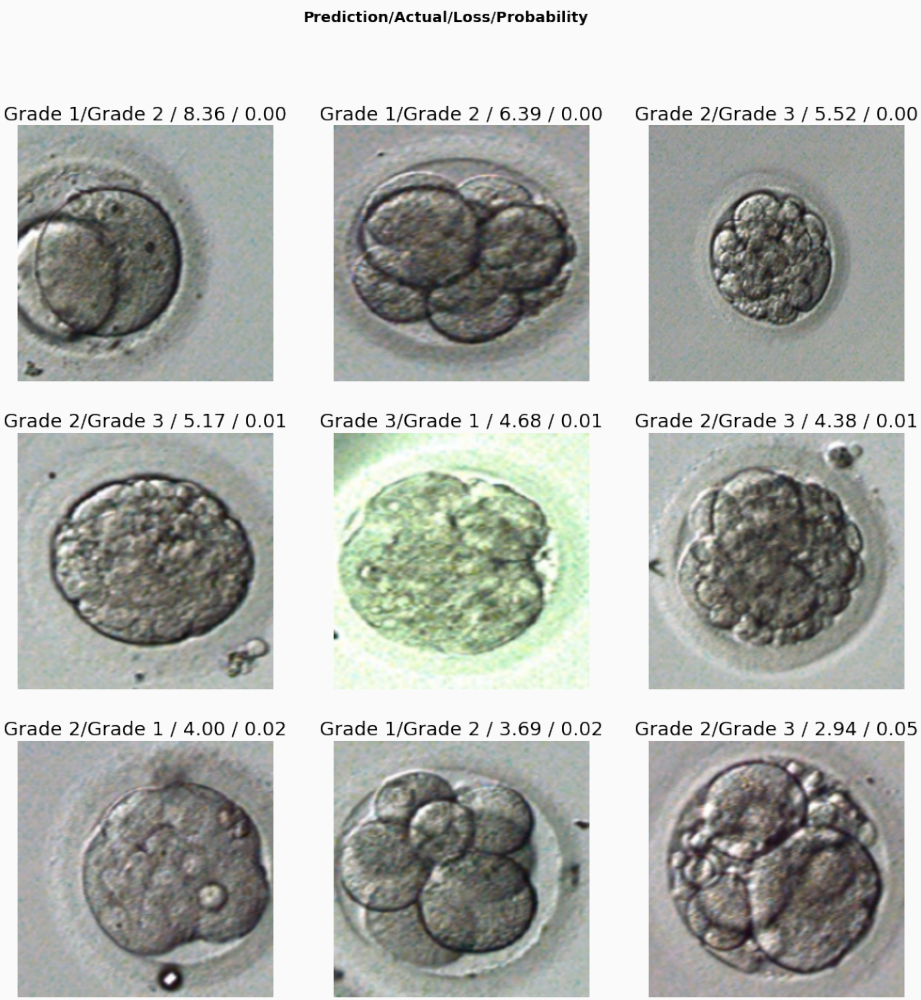


Figure 6: Klasifikasi mutu embrio (Septiandri et al., 2020)

Face Recognition

Figure 7: e-KYC (identifai.id, 2020)

Object Detection

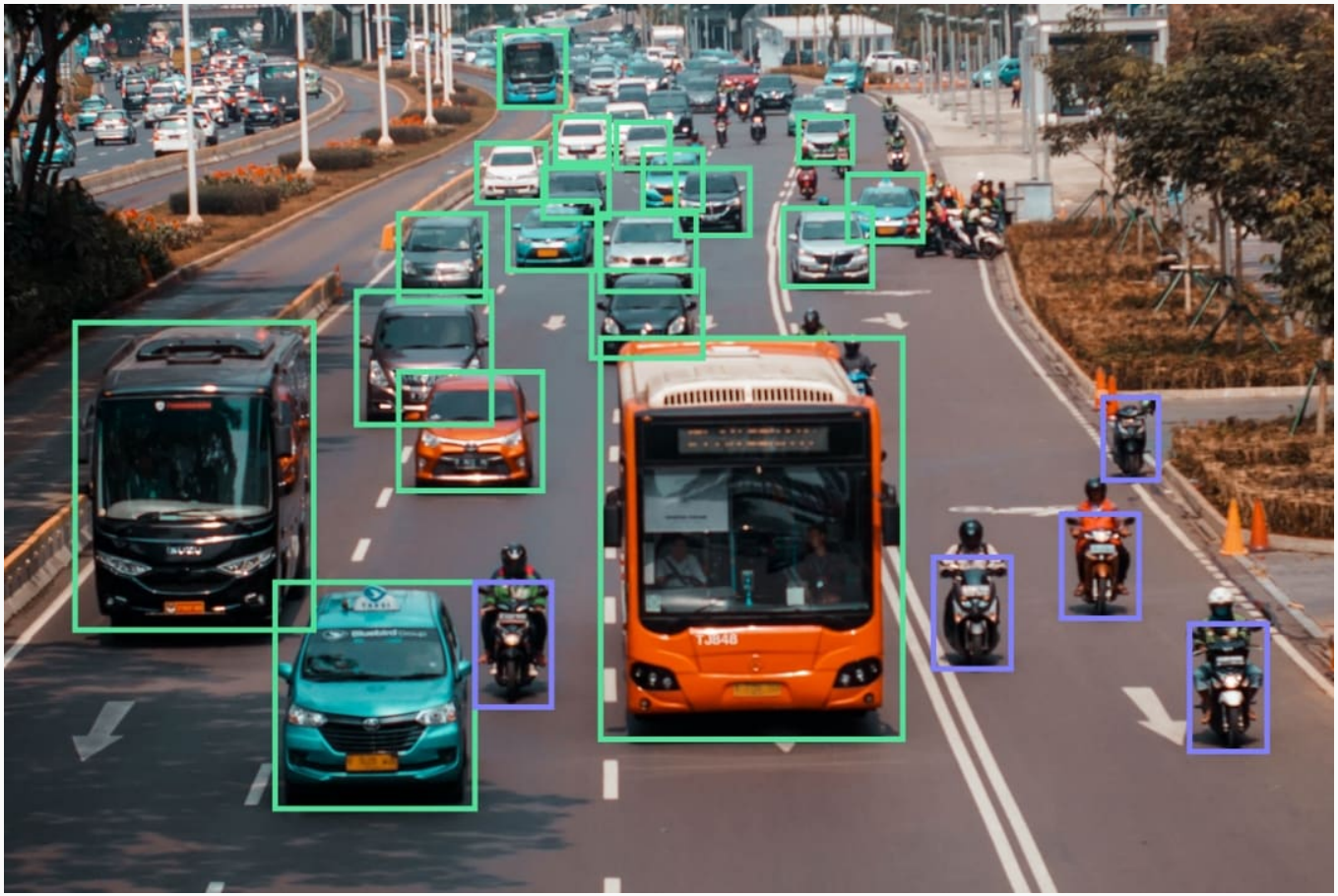


Figure 8: Memonitor lalu lintas jalan raya (nodeflux.io, 2020)

Object Detection - Healthcare

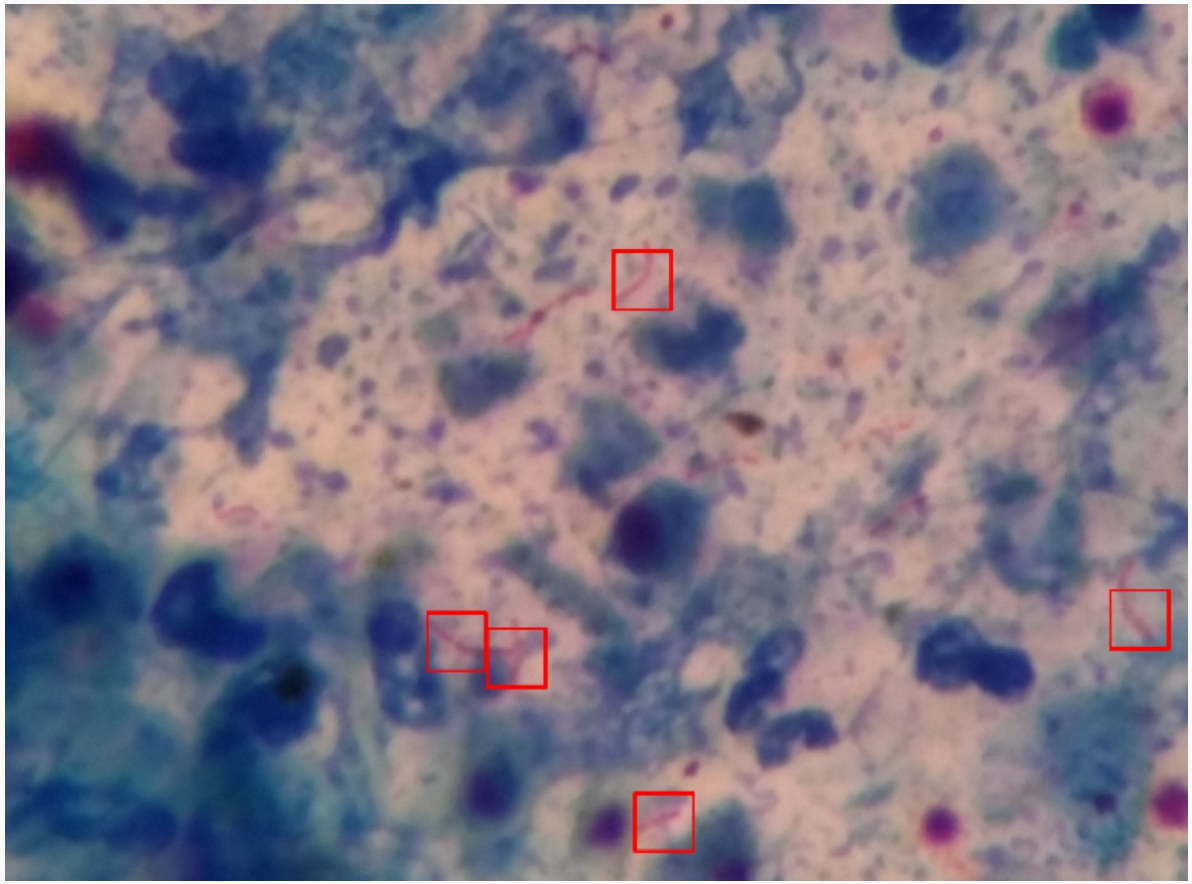


Figure 9: Deteksi bakteri tuberkulosis (Quinn et al., 2016)

Style Transfer

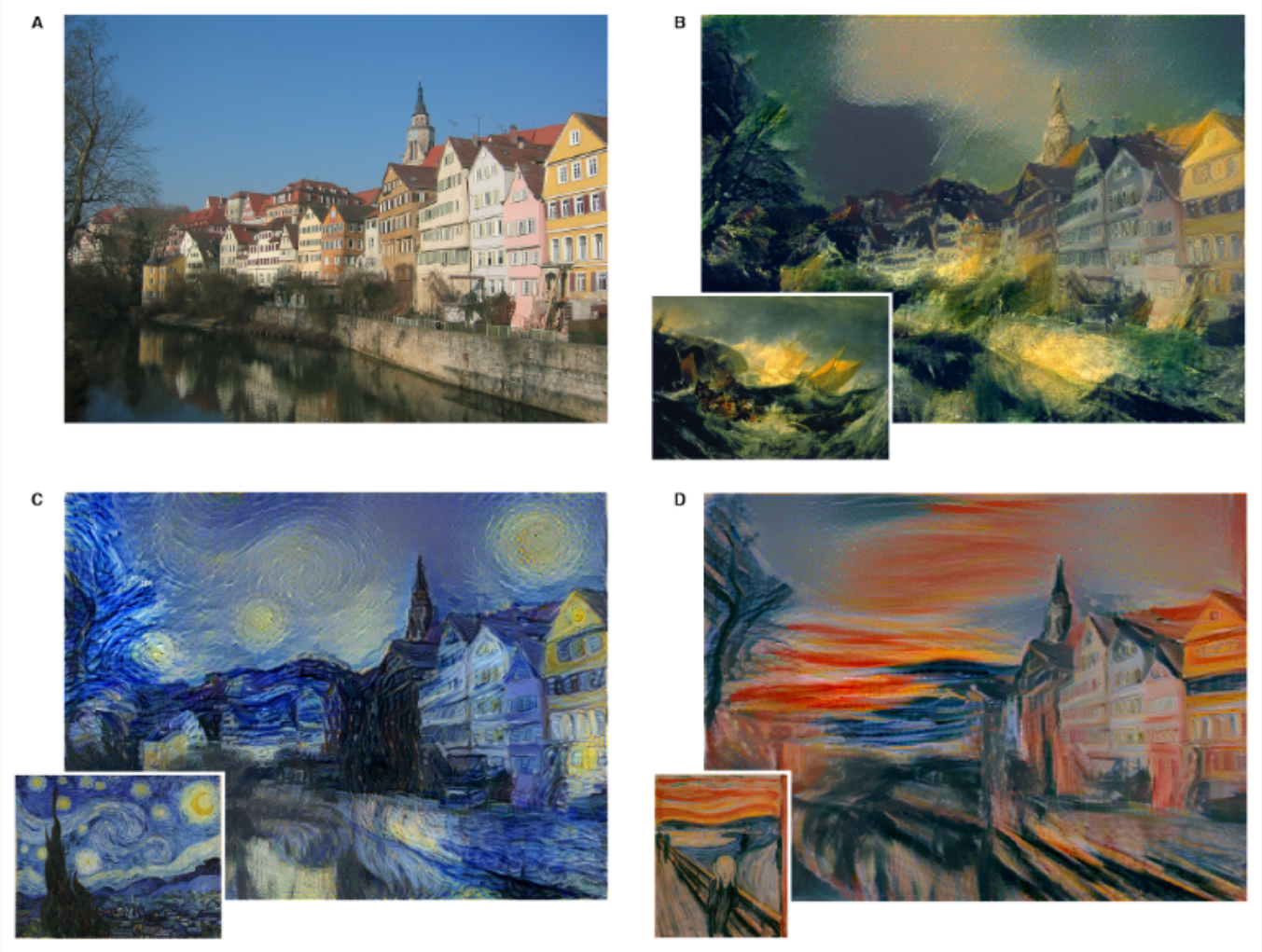


Figure 10: Menggunakan komposisi lukisan ke citra lain (Gatys et al., 2015)

Deepfake

Figure 11: Orang-orang ini tidak asli, tapi diciptakan dari generator StyleGAN (Karras et al., 2018)

Human Pose Estimation

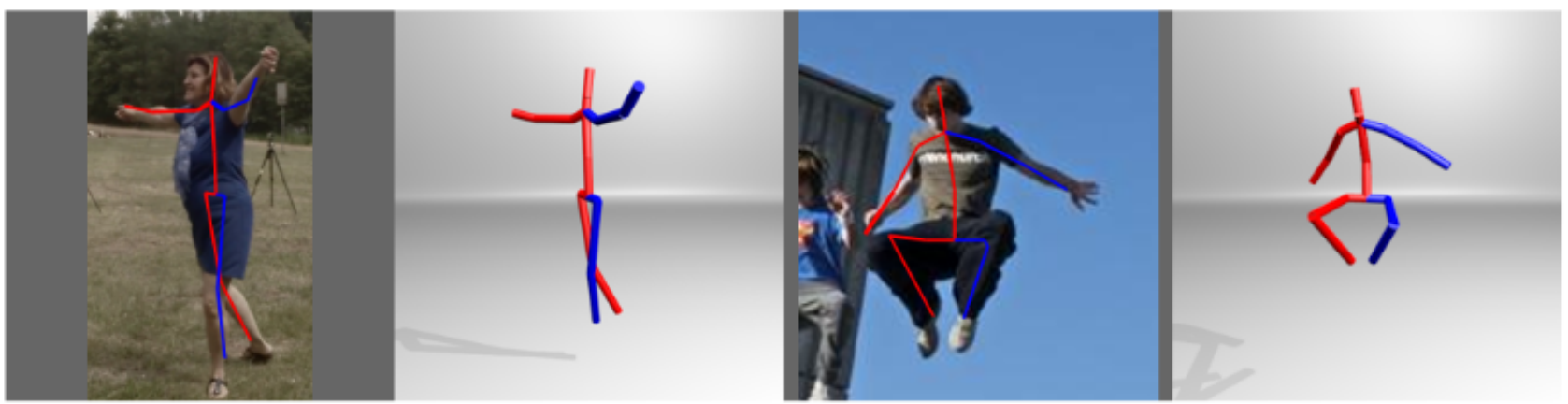


Figure 12: Estimasi pose manusia (Habibie et al., 2019)

Character Motion Synthesis

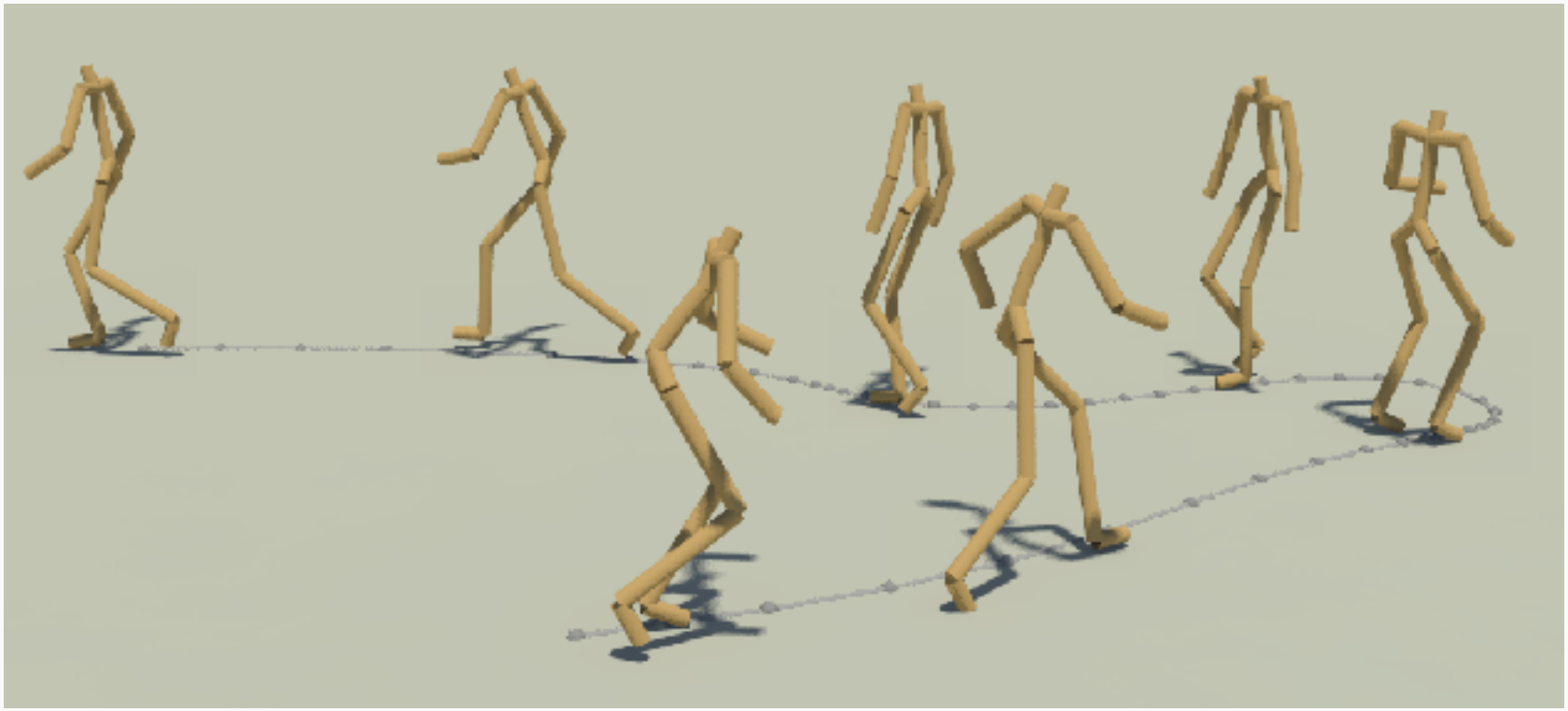


Figure 13: Sintesis gerakan (motion) (Holden et al., 2016)

Image Captioning

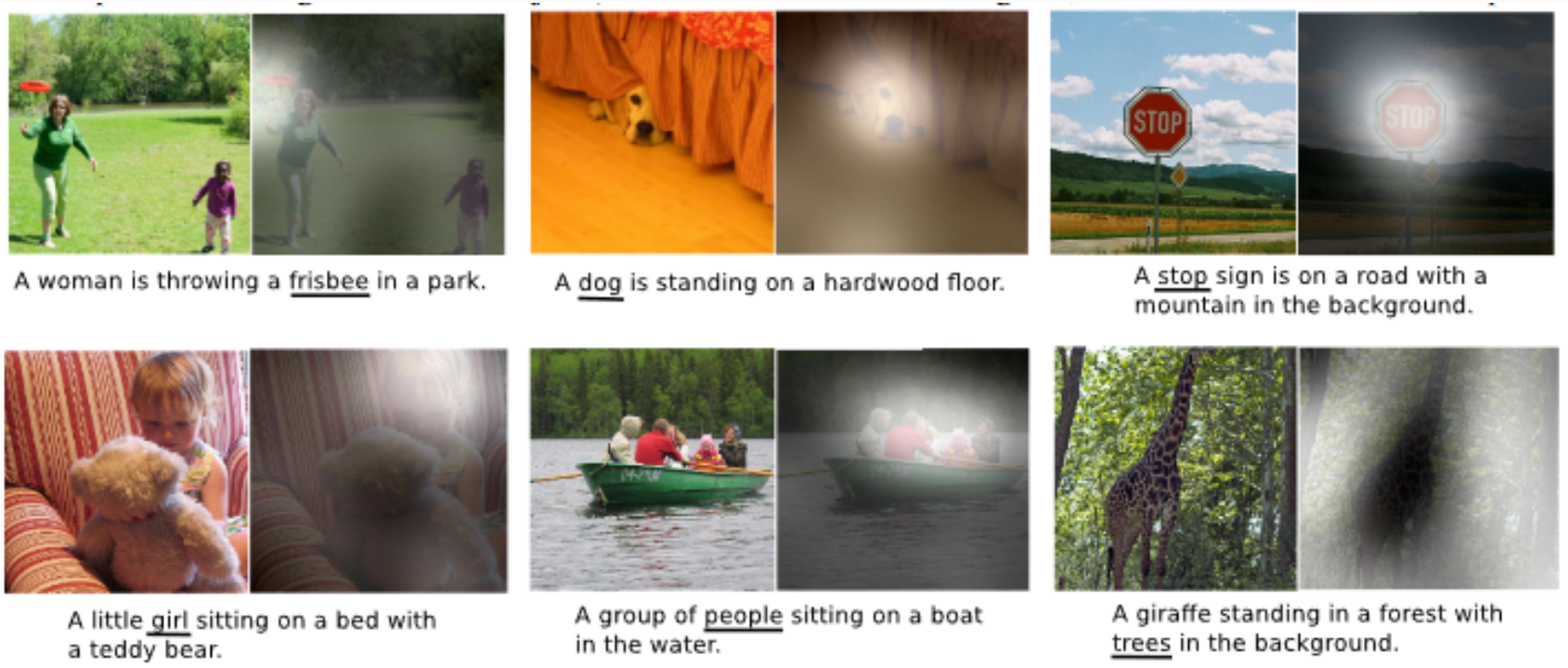


Figure 14: Membuat caption otomatis dan menunjukkan titik fokusnya (Xu et al., 2015)

GAN Conditioned by Brain Signals

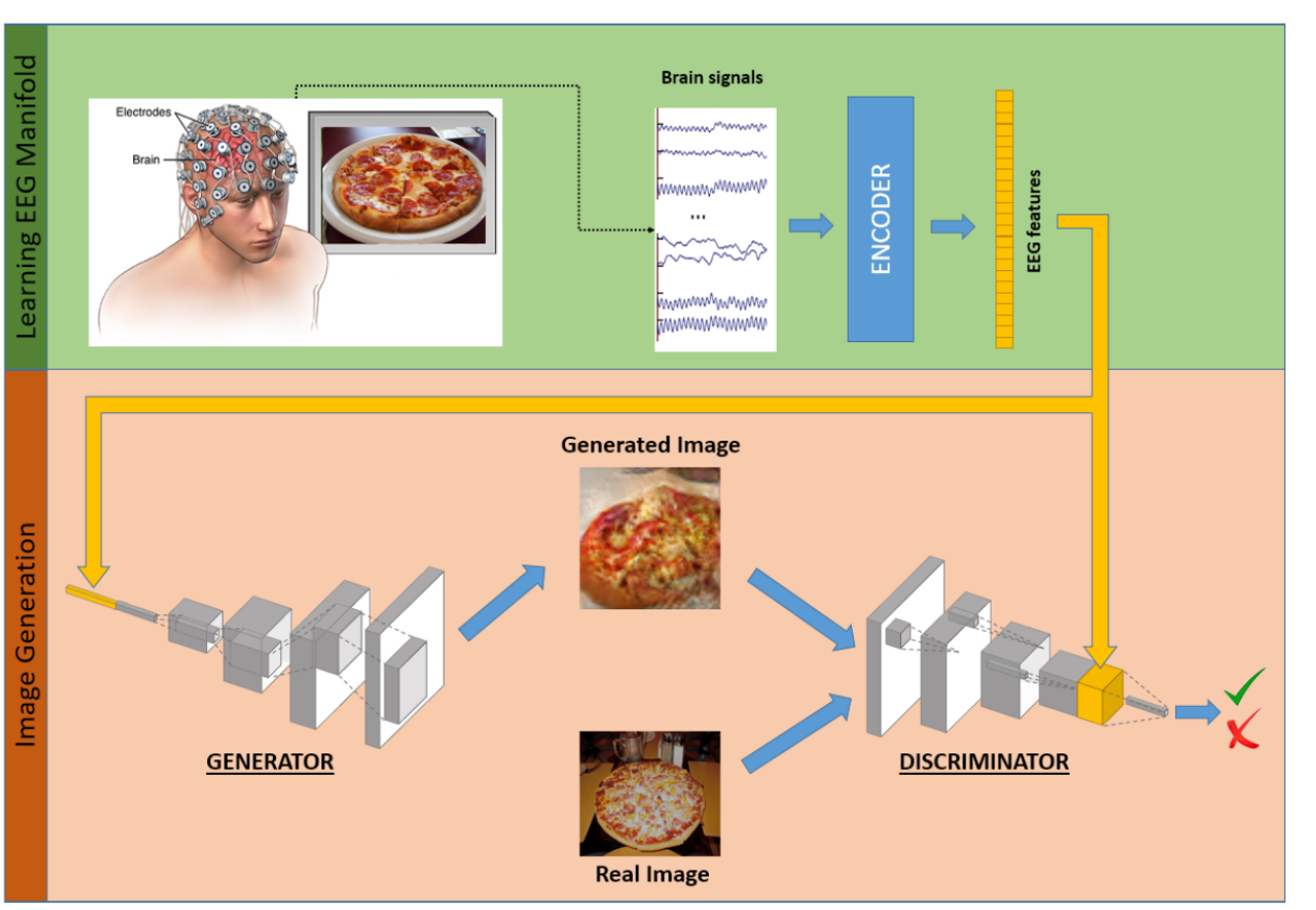


Figure 15: Menggunakan sinyal otak untuk menghasilkan citra (Palazzo et al., 2017)

Kelemahan AI dalam Computer Vision

Adversarial Attacks

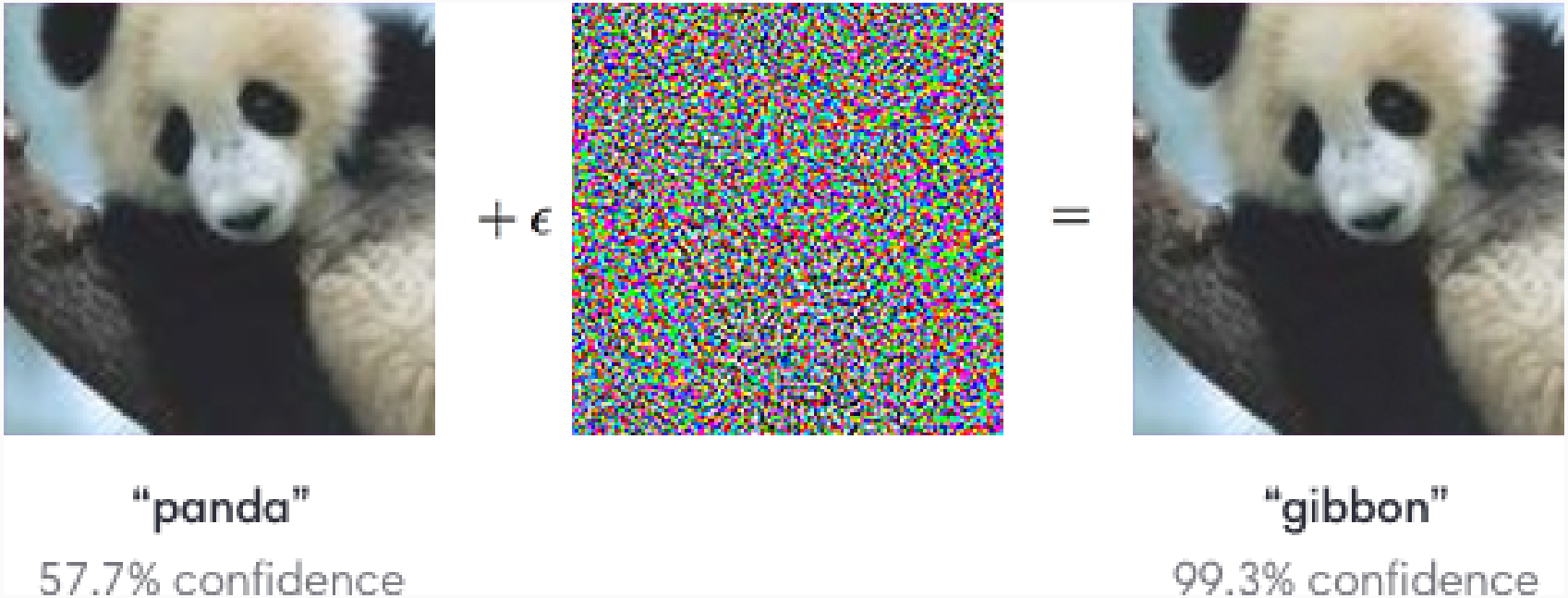


Figure 16: Menipu model DL dengan memberikan “noise” (Goodfellow et al., 2015)

Adversarial Attacks

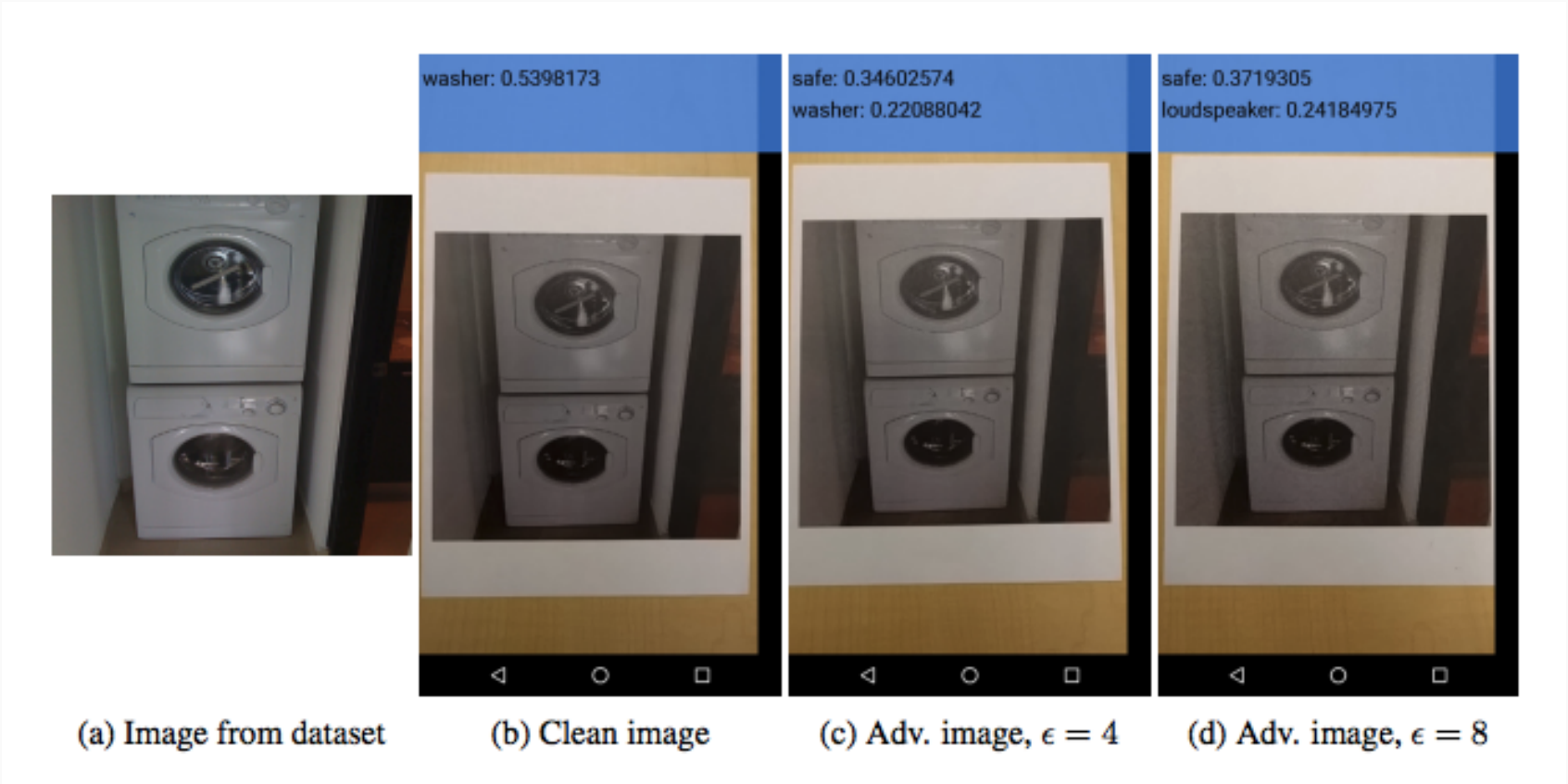


Figure 17: Meski dicetak, model tetap salah mengklasifikasikan! (Kurakin et al., 2017)

One Pixel Attacks

Figure 18: Mengubah satu piksel dapat mengacaukan prediksi (Su et al., 2019)

“Mengapa AI belum bisa memajukan bidang yang penting seperti kesehatan?”

Bahaya dalam Dunia Kesehatan

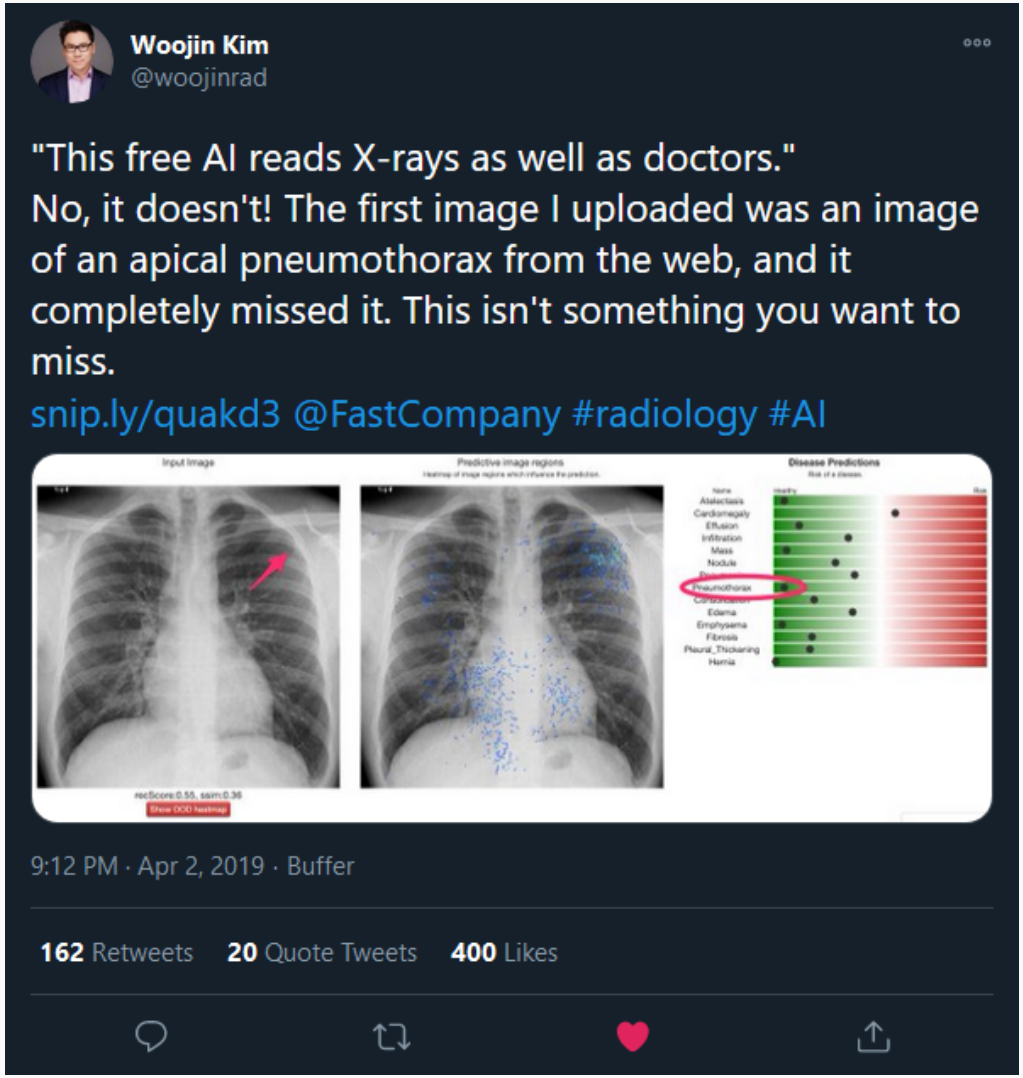


Figure 19: Kesalahan prediksi untuk kasus yang sudah jelas

Bias dalam AI

"...a project to look for skin cancer in photographs. It turns out that dermatologists often put rulers in photos of skin cancer, for scale, but that the example photos of healthy skin do not contain rulers. To the system, the rulers (or rather, the pixels that we see as a ruler) were just differences between the example sets, and sometimes more prominent than the small blotches on the skin. So, the system that was built to detect skin cancer was, sometimes, detecting rulers instead." (Evans, 2019)

Referensi

Kuliah

1. Stanford CS131: Computer Vision
2. Stanford CS231n: Convolutional Neural Networks for Visual Recognition
3. Berkeley CS280: Computer Vision

Grup CV

- Geoffrey Hinton (Toronto)
- Yann LeCun (NYU)
- Yoshua Bengio (Montreal)
- Fei-Fei Li (Stanford)
- Andrew Ng (Stanford)
- Andrej Karpathy (Tesla)
- Jitendra Malik (UCBerkeley)
- Jürgen Schmidhuber (IDSIA)
- David Ha (Google Japan)
- Ian Goodfellow (Apple)
- Andrew Zisserman (Oxford)
- Kaiming He (Facebook)

Peneliti Indonesia di CV

- BukaLapak: Muhammad Haris, Muhammad Ghifary
- nodeflux.io: Adhiguna Mahendra, Faris Rahman
- Ikhsanul Habibie (MPI), Febrian Rachmadi (UI-RIKEN), Gratianus Wesley (Oxford), Andru Twinanda (Intel), Avan Suinesiaputra (Leeds)

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