

Computer Vision

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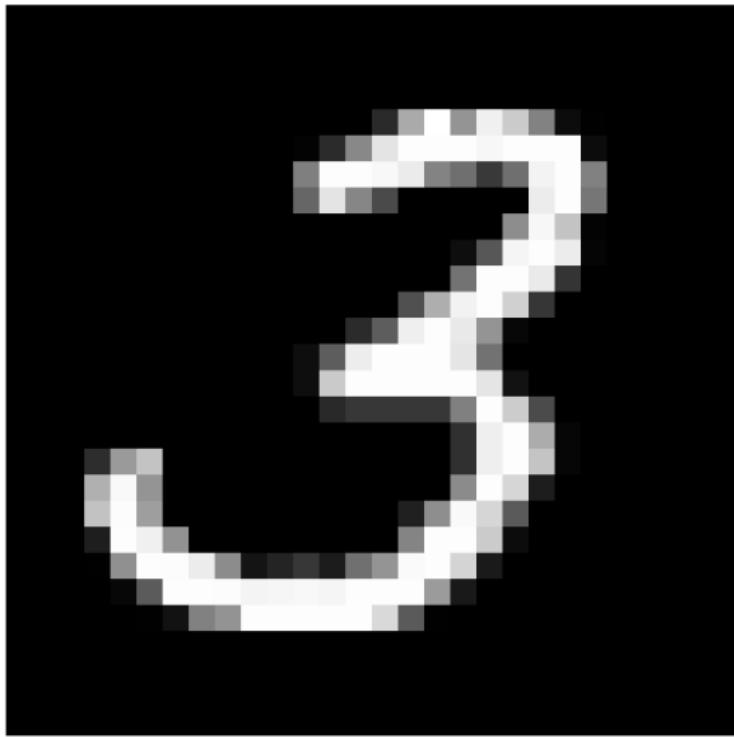
Daftar isi

1. Computer Vision
2. Tugas-tugas dalam Computer Vision
3. Kelemahan AI dalam Computer Vision
4. Referensi

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

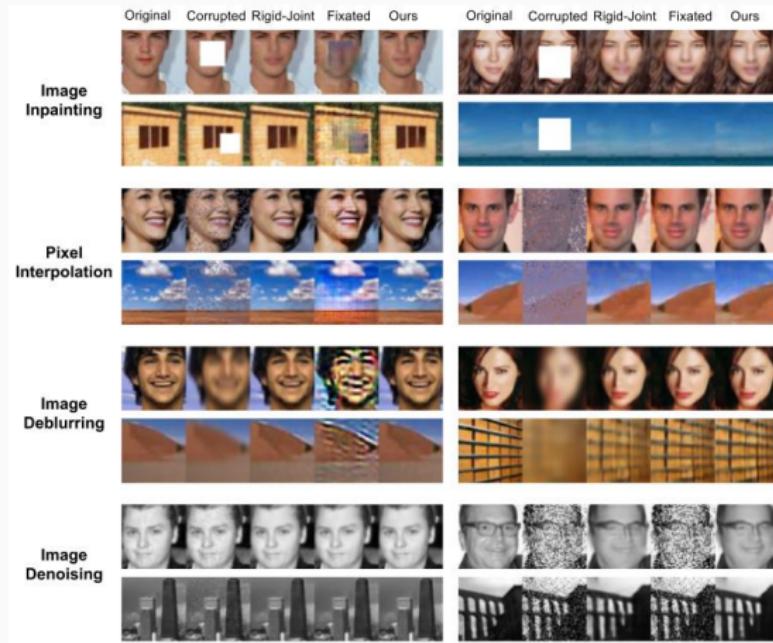


Figure 1: Beberapa tugas restorasi citra (Gao and Grauman, 2017)

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

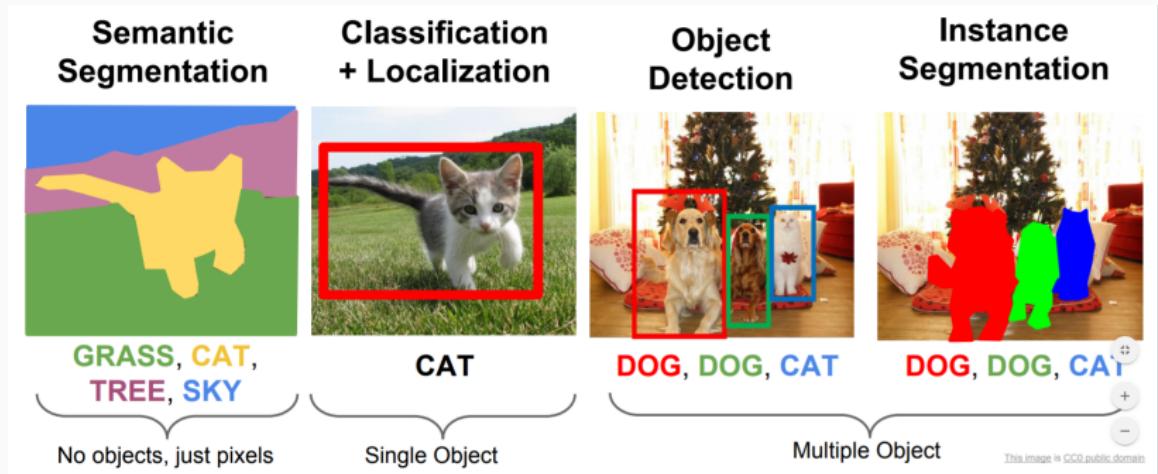


Figure 4: Deteksi vs segmentasi (Data Flair, 2020)

Image Classification

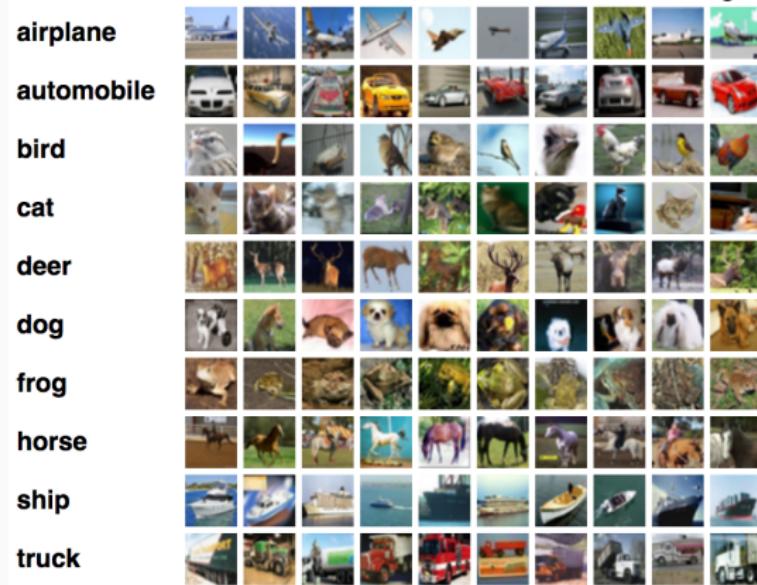


Figure 5: CIFAR-10 - 10 kelas dari gambar berukuran 32x32 piksel
(Krizhevsky, 2009)

Image Classification - Healthcare

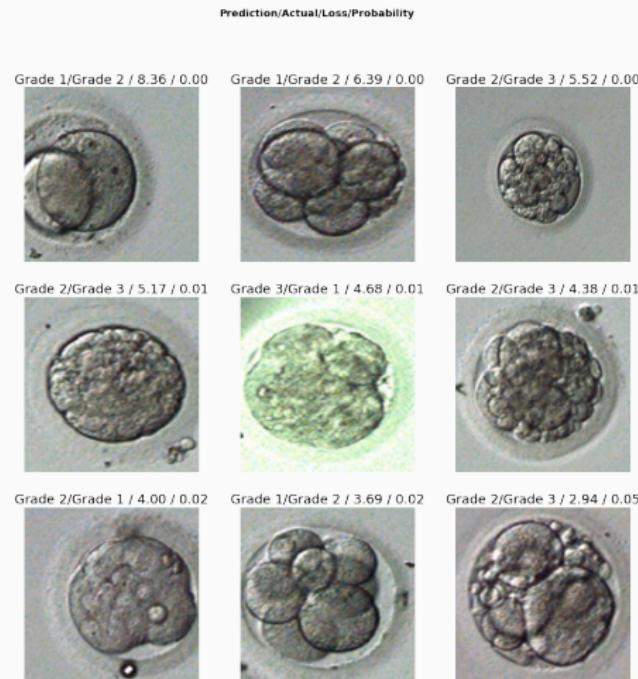


Figure 6: Klasifikasi mutu embrio (Septiandri et al., 2020)

Face Recognition

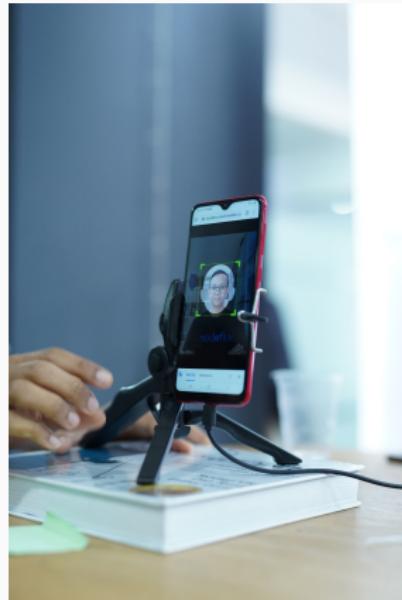


Figure 7: e-KYC (identifai.id, 2020)

Object Detection

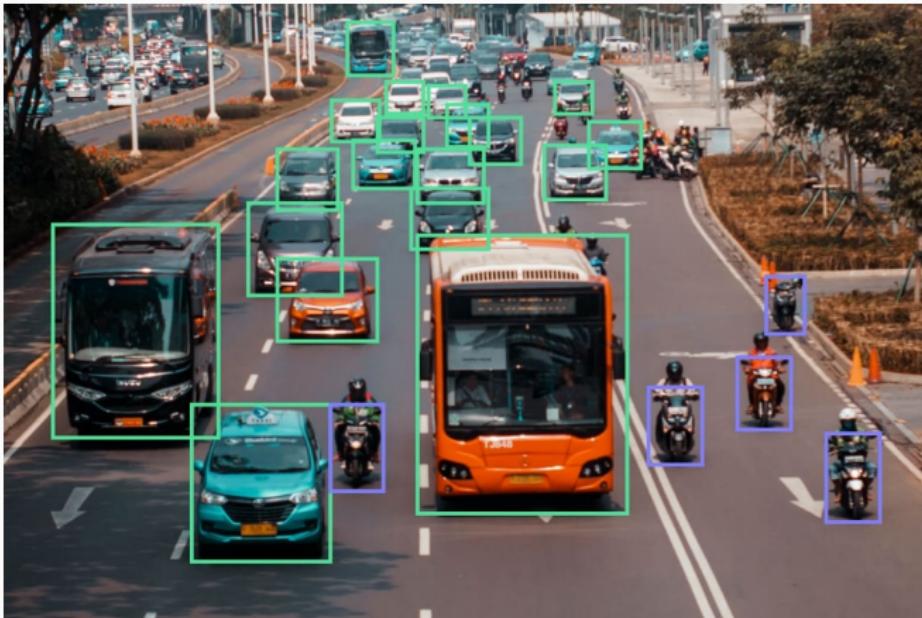


Figure 8: Memonitor lalu lintas jalan raya (nodeflux.io, 2020)

Object Detection - Healthcare

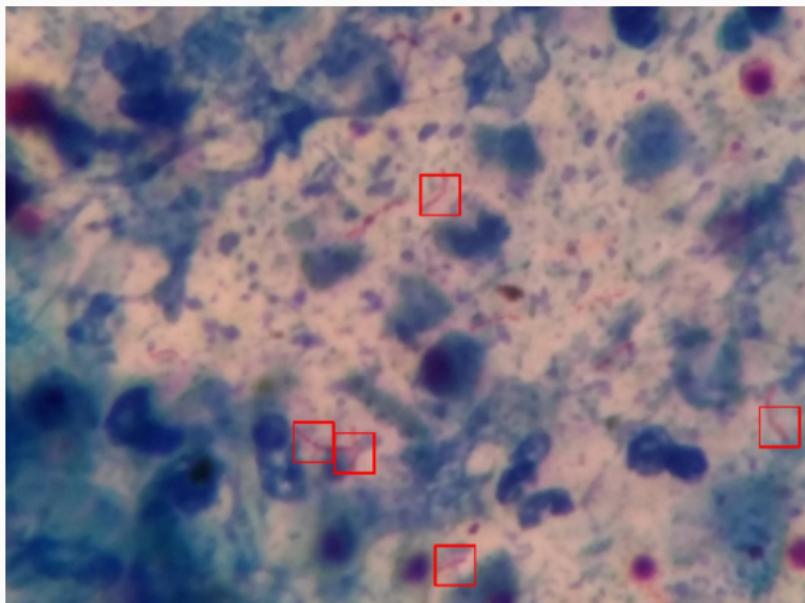


Figure 9: Deteksi bakteri tuberkulosis (Quinn et al., 2016)

Style Transfer



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

Deepfake

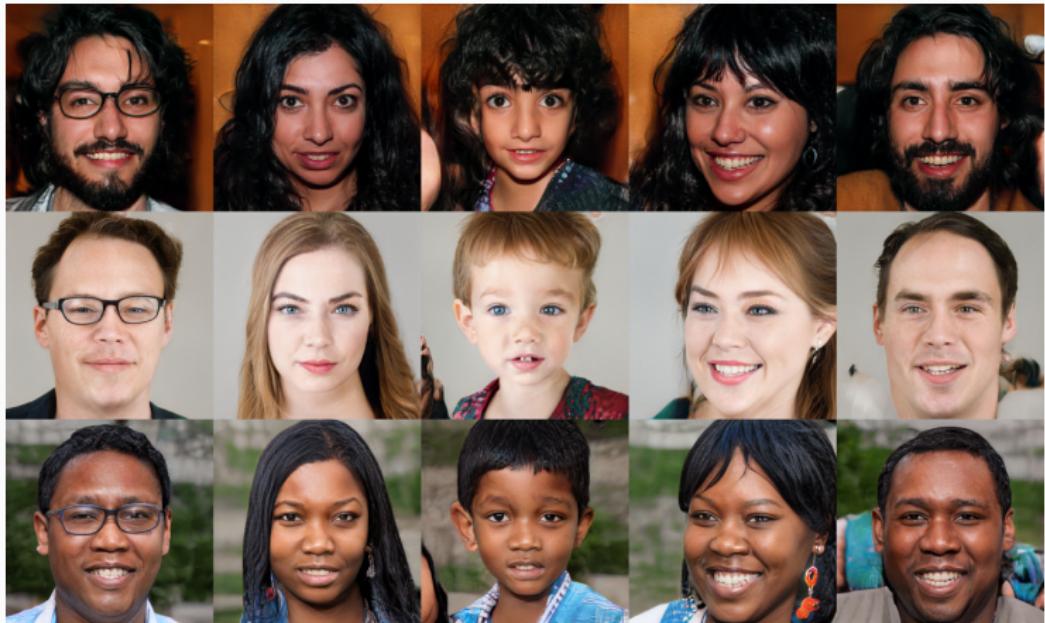


Figure 11: Orang-orang ini tidak asli, tapi diciptakan dari generator StyleGAN (Karras et al., 2018)

Human Pose Estimation

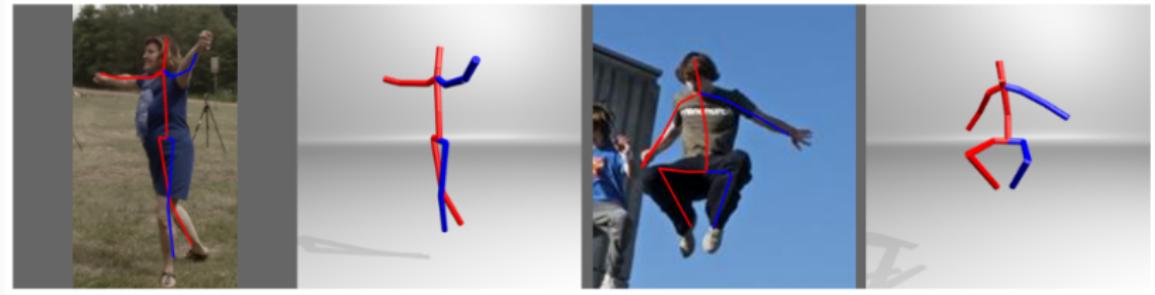


Figure 12: Estimasi pose manusia (Habibie et al., 2019)

Character Motion Synthesis

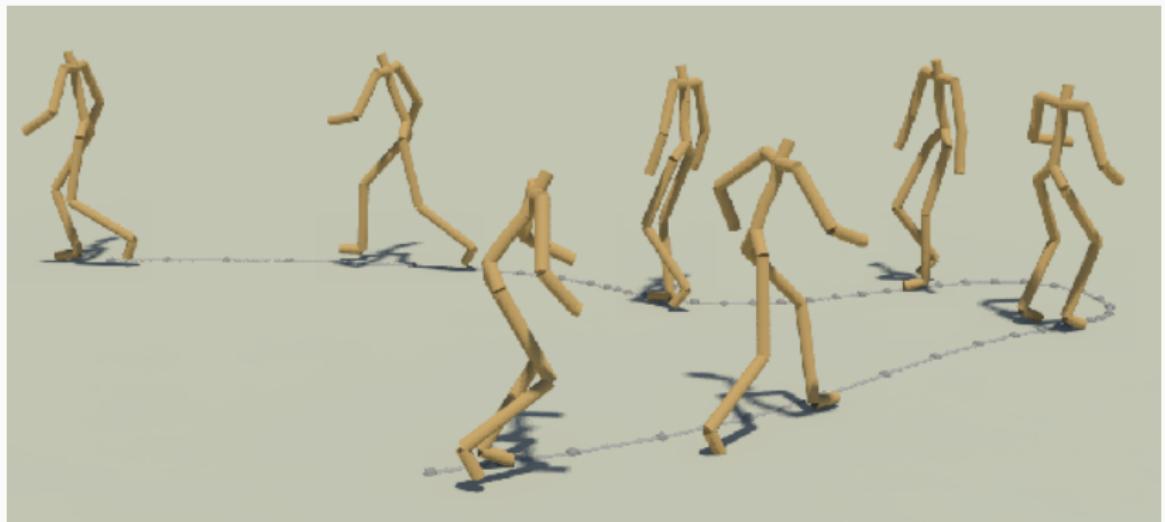
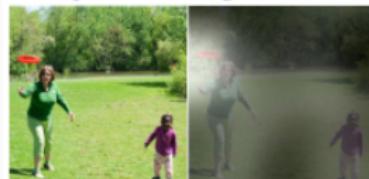


Figure 13: Sintesis gerakan (motion) (Holden et al., 2016)

Image Captioning



A woman is throwing a frisbee in a park.



A dog is standing on a hardwood floor.



A stop sign is on a road with a mountain in the background.



A little girl sitting on a bed with a teddy bear.



A group of people sitting on a boat in the water.



A giraffe standing in a forest with trees in the background.

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

GAN Conditioned by Brain Signals

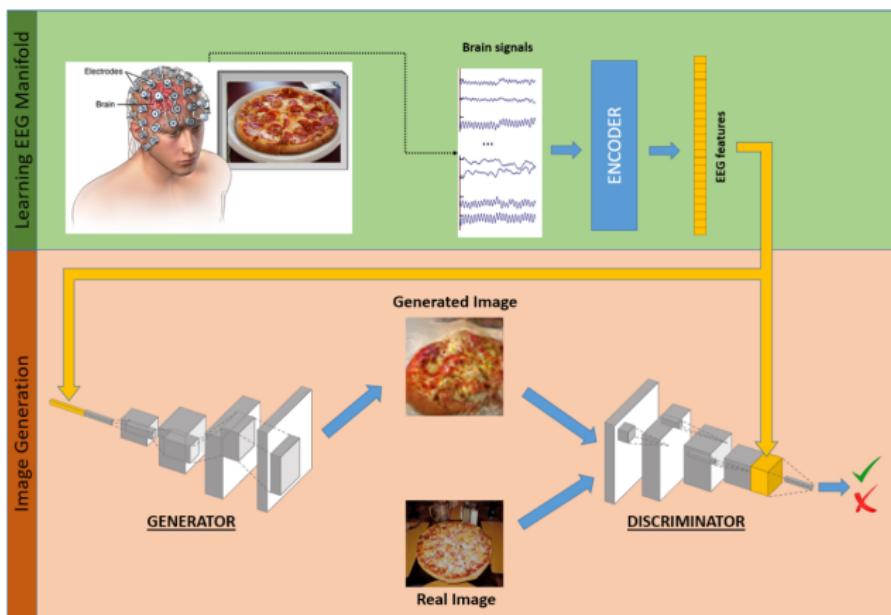


Figure 15: Menggunakan sinyal otak untuk menghasilkan citra (Palazzo et al., 2017)

Kelemahan AI dalam Computer Vision

Adversarial Attacks

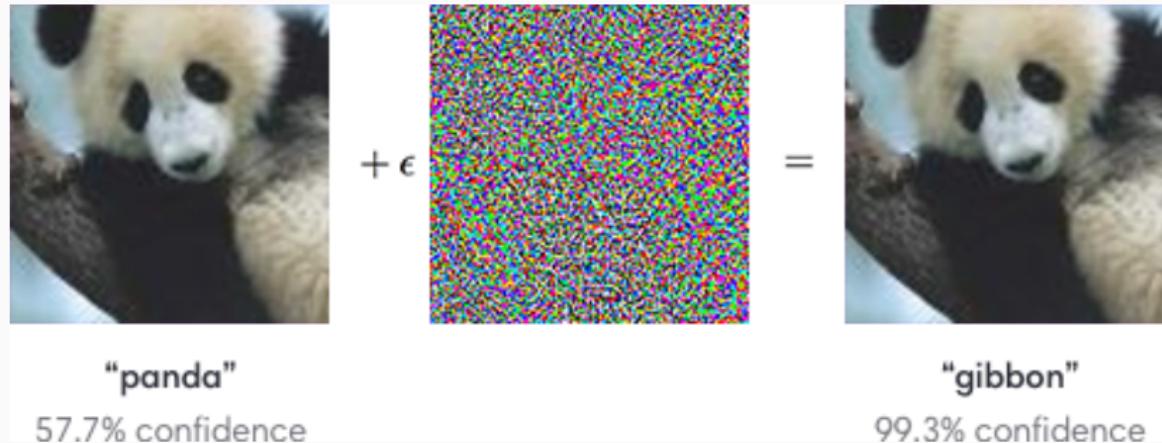


Figure 16: Menipu model DL dengan memberikan “noise” (Goodfellow et al., 2015)

Adversarial Attacks

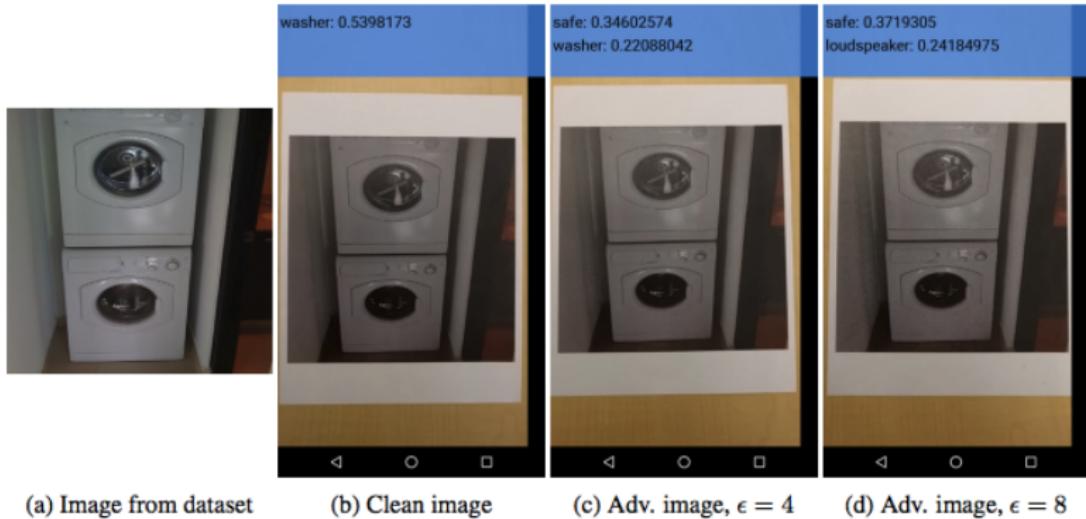


Figure 17: Meski dicetak, model tetap salah mengklasifikasikan!
(Kurakin et al., 2017)

One Pixel Attacks



Cup(16.48%)
Soup Bowl(16.74%)



Bassinet(16.59%)
Paper Towel(16.21%)



Teapot(24.99%)
Joystick(37.39%)



Hamster(35.79%)
Nipple(42.36%)

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

Woojin Kim
@woojinrad

"This free AI reads X-rays as well as doctors."
No, it doesn't! The first image I uploaded was an image of an apical pneumothorax from the web, and it completely missed it. This isn't something you want to miss.

snip.ly/quakd3 @FastCompany #radiology #AI

The image shows three panels: 1. Input Image: A frontal chest X-ray with a red arrow pointing to the right lung field. 2. Predictive Image Regions: The same X-ray with numerous small blue boxes overlaid across both lungs, indicating where the AI predicted findings. 3. Disease Predictions: A scatter plot showing the probability of various diseases. The y-axis lists diseases: Non-Alcoholic Cardiomegaly, Effusion, Infiltrate, Mass, Nodule, Pneumothorax, Edema, Emphysema, Fracture, Pleural Thickening, and Hernia. The x-axis represents probability from 0.00 to 1.00. The 'Pneumothorax' point is located in the green region (low probability), while the 'Effusion' point is in the red region (high probability).

9:12 PM · Apr 2, 2019 · Buffer

162 Retweets 20 Quote Tweets 400 Likes

Q R E

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

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

- 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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