GUNADARMA UNIVERSITY

ESTIMASI POSE TIGA DIMENSI DARI GAMBAR MONOKULER MENGGUNAKAN DEEP NEURAL NETWORK

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Jurusan : Teknik Informatika

Pembimbing: Dr. Dharmayanti, ST., MM

UG | SKRIPSI UNIVERSITASGUNADARMA

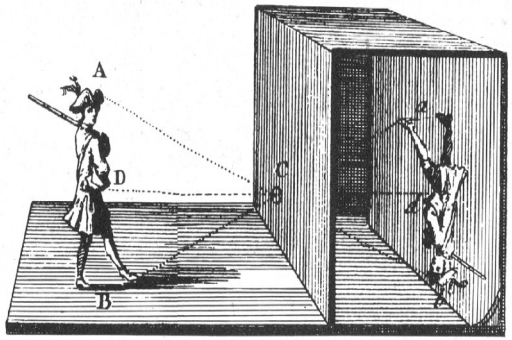
LATAR BELAKANG

Pemanfaatan Teknologi Digital

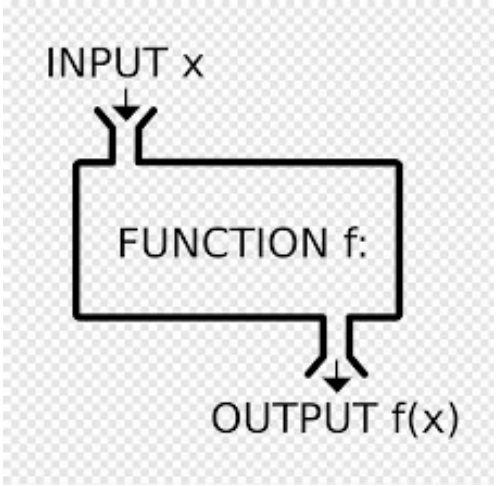
Menghasilkan Data/Jejak Digital

Data Digital Bersifat Laten :
Tersebunyi; diolah secara khusus

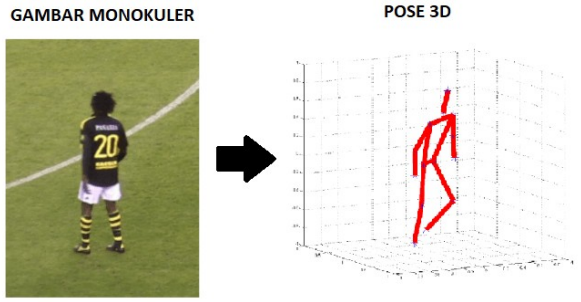
Hilangnya Informasi Posisi
Terhadap Kamera Monokuler



Rekronstruksi Ulang dengan
Sebuah Fungsi Pemetaan



Estimasi Pose Tiga Dimensi



TUJUAN PENELITIAN

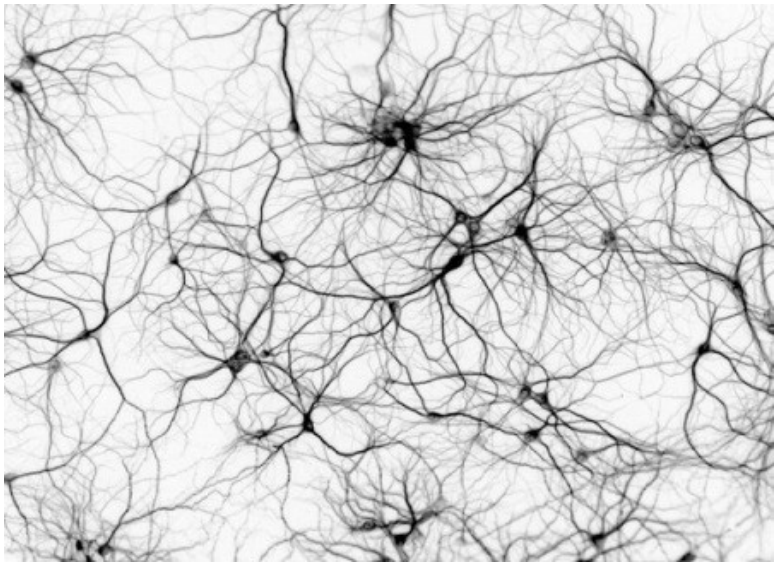
Aplikasi:

- Estimasi titik kunci pose tiga dimensi dari sebuah citra visual monokuler / datar.
- Fungsi pemetaan / estimasi menggunakan neural network
- Visualisasi

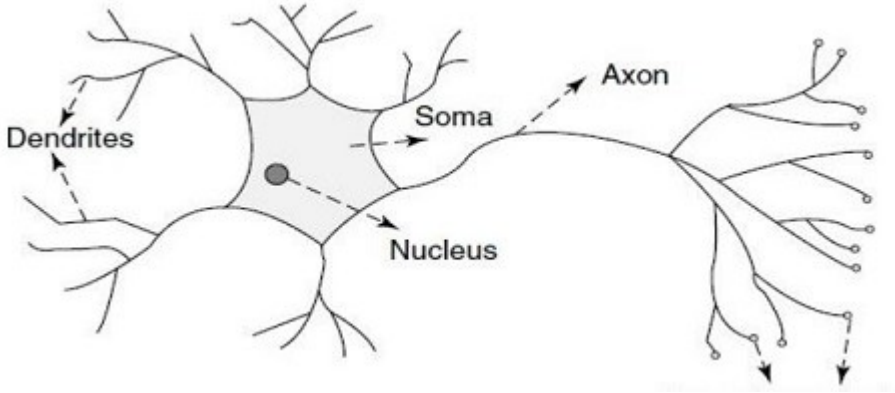
SISTEM SARAF

Gunadarma UG University

Jaringan Saraf

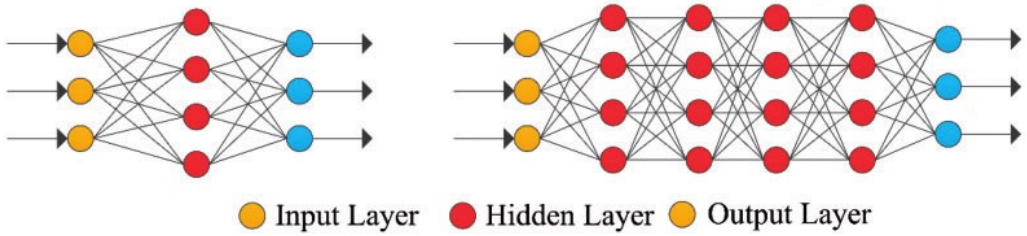


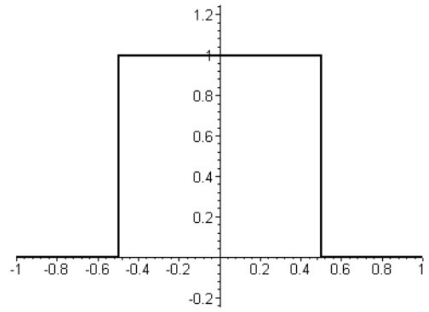
Sel Saraf

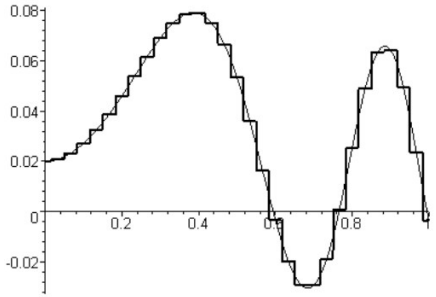


TEOREMA PENAKSIRAN UNIVERSAL

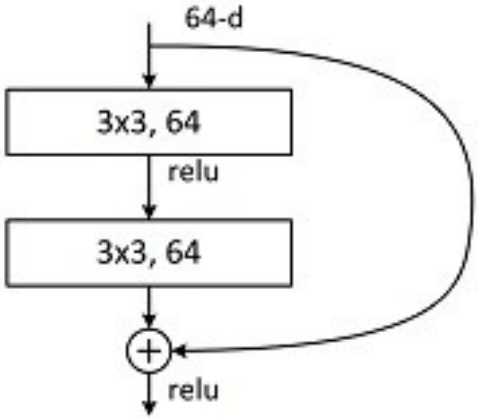
- Sebuah model jaringan feed-forward dapat membentuk fungsi apapun secara subjektif.
- Sebuah model jaringan saraf tiruan dibentuk dari serangkaian lapisan
- Didalamnya terdapat deretan sel saraf atau neuron
- Rangkaian lapisan panjang dapat memetakan fungsi yang sulit

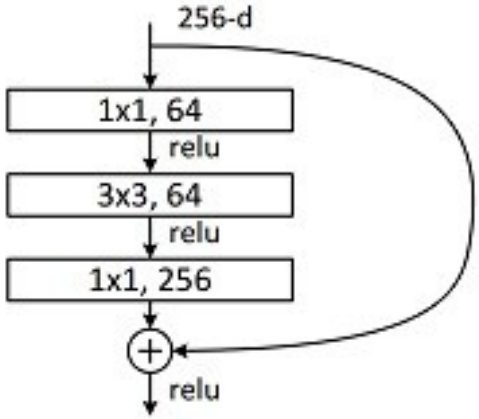






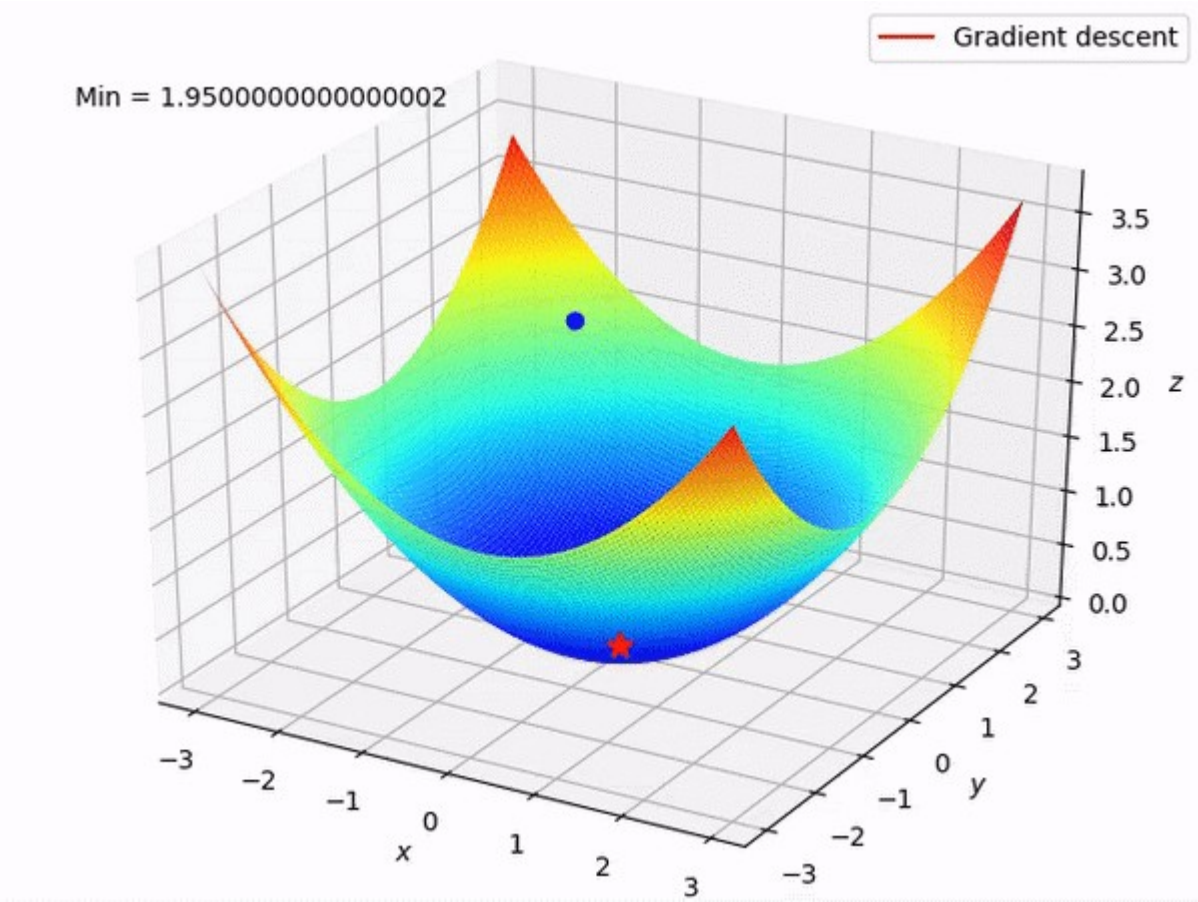
RESIDUAL NETWORK



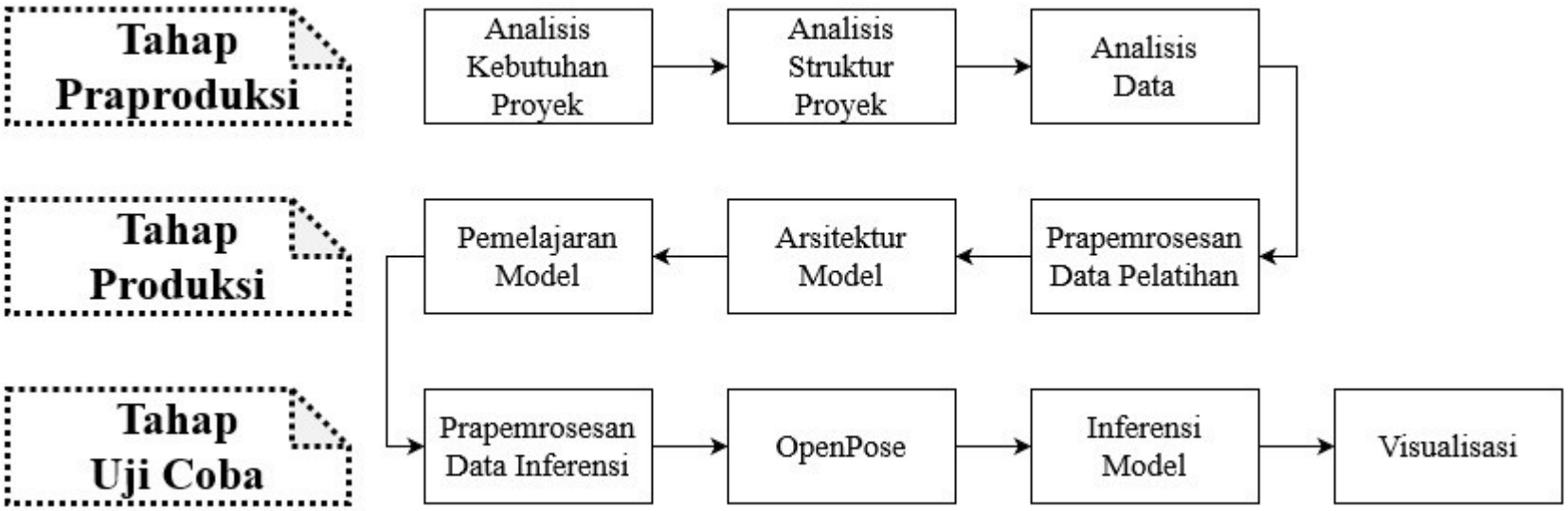


GRADIENT DESCENT

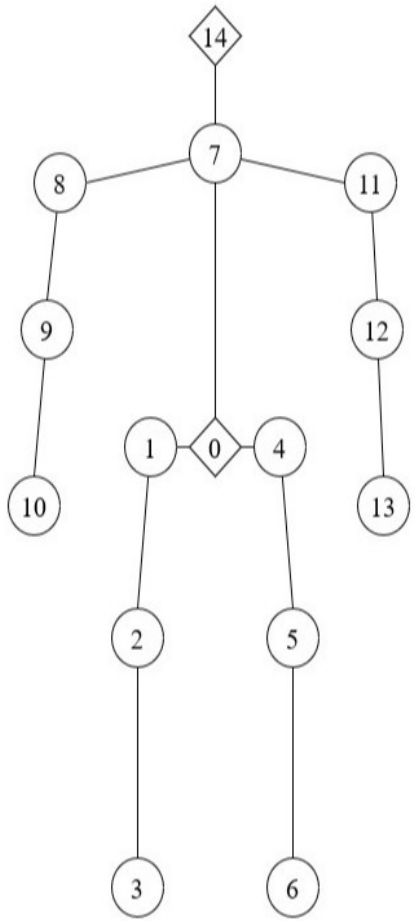
$$MSE = \frac{1}{n}\Sigma_{i=1}^{n}\left(\frac{d_i - f_i}{\sigma_i}\right)^2$$



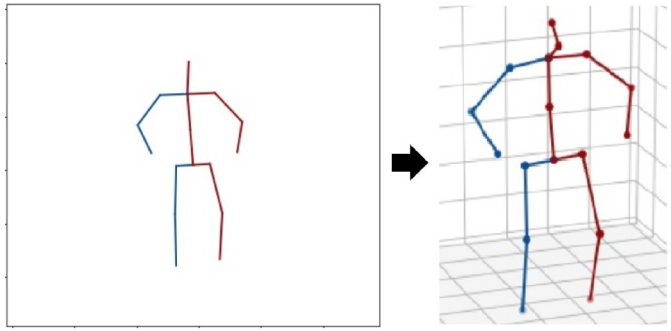
KERANGKA PENELITIAN



DATA PELATIHAN



0 – Pinggang
1 – Paha Kanan
2 – Lutut Kanan
3 – Pergelangan Kaki Kanan
4 – Paha Kiri
5 – Lutut Kiri
6 – Pergelangan Kaki Kiri
7 – Leher
8 – Bahu Kanan
9 – Siku Kanan
10 – Pergelangan Tangan Kanan
11 – Bahu Kiri
12 – Siku Kiri
13 – Pergelangan Tangan Kiri
14 – Kepala



Bentuk Vektor Datar:

2D: [PGx, PGy, PKAx, PKAy, ...]

3D: [PGx, PGy, PGz, PKAx, PKAy, PKAz, ...]

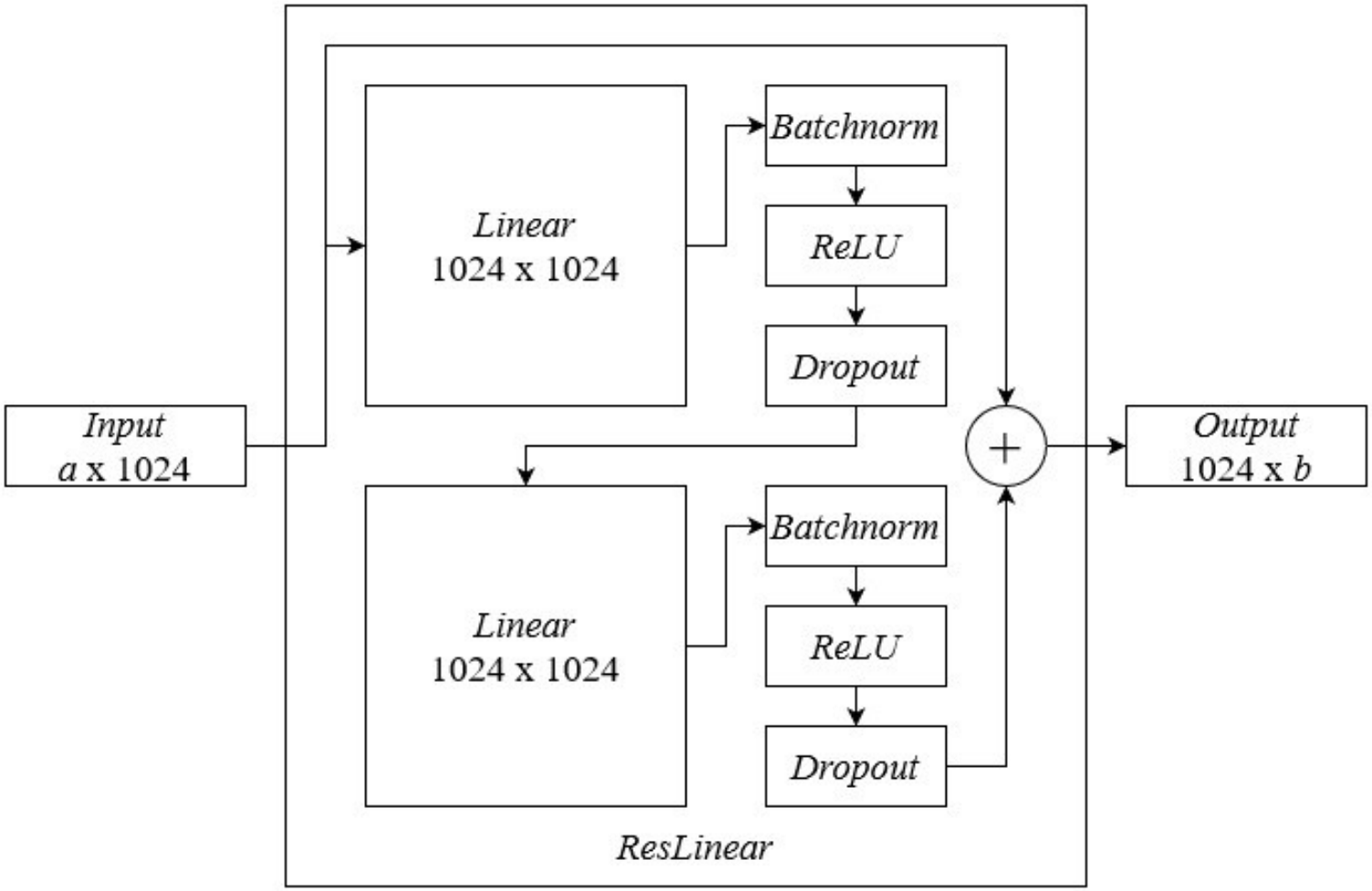
Terdapat 2110396 pasang titik kunci.

75% => Pelatihan

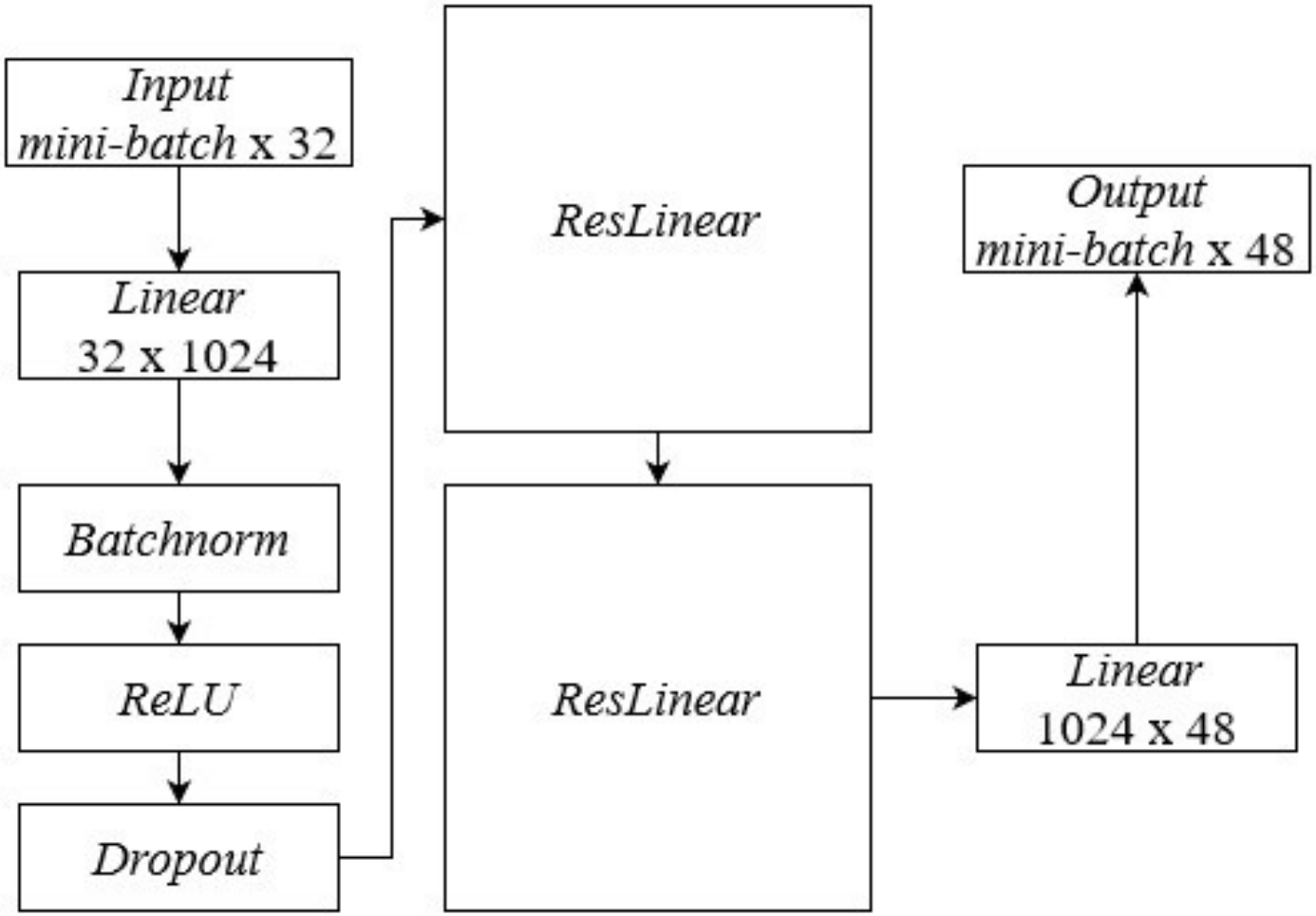
25% => Validasi

Ionescu et al. Human3.6m: Large scale datasets and predictive methods for 3d human sensing in natural environments

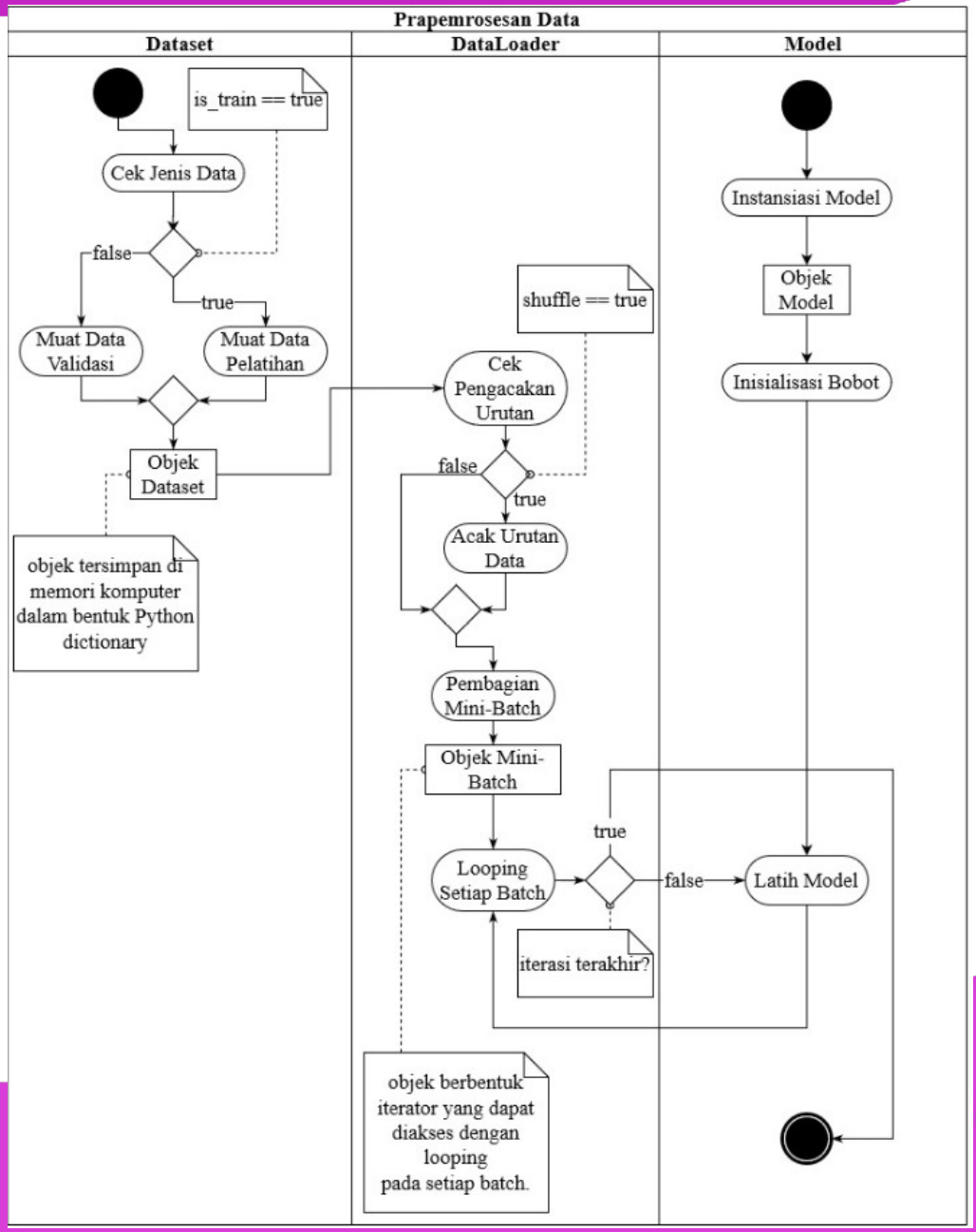
RESIDUAL LINEAR



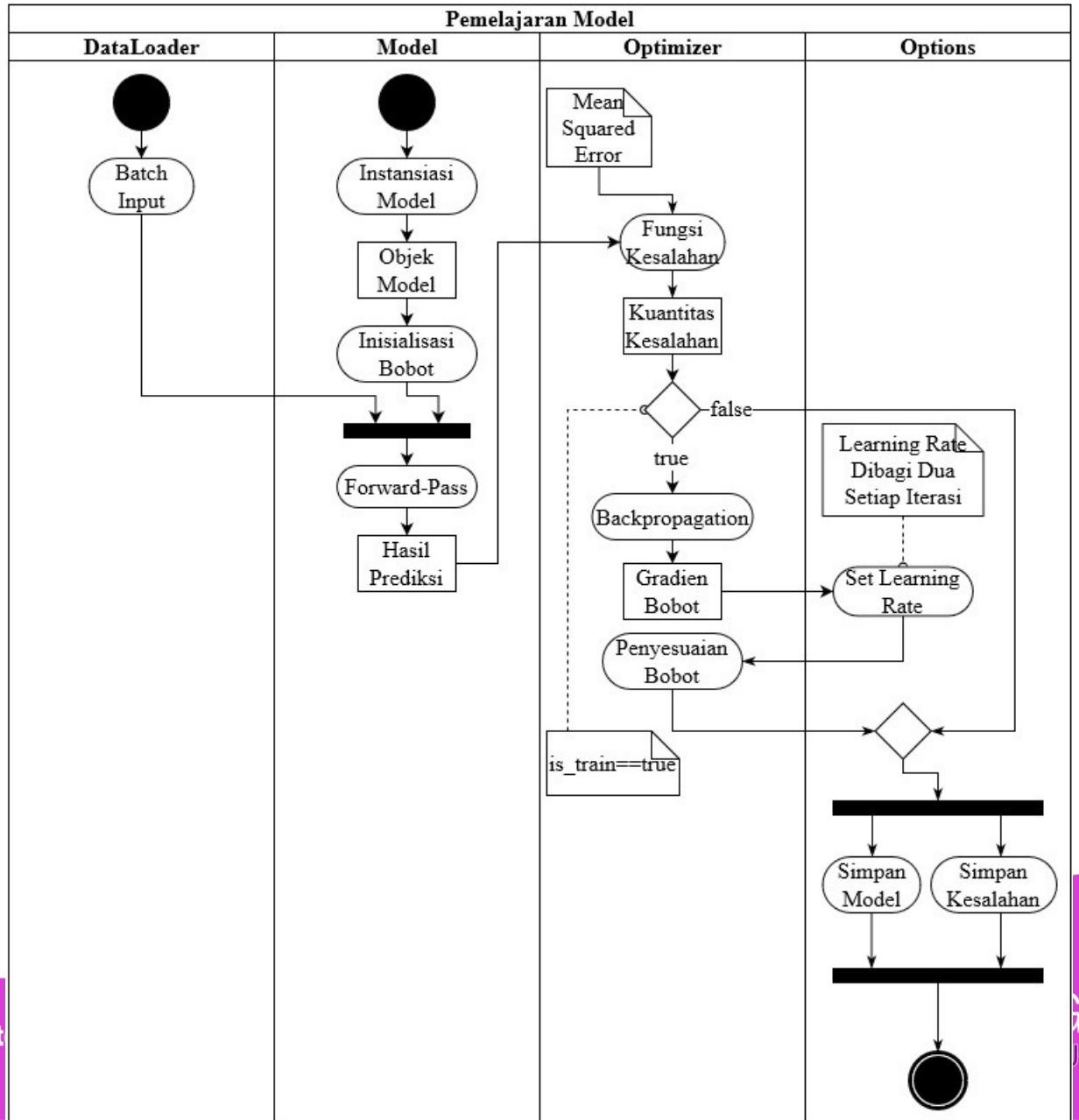
MODEL NEURAL NETWORK



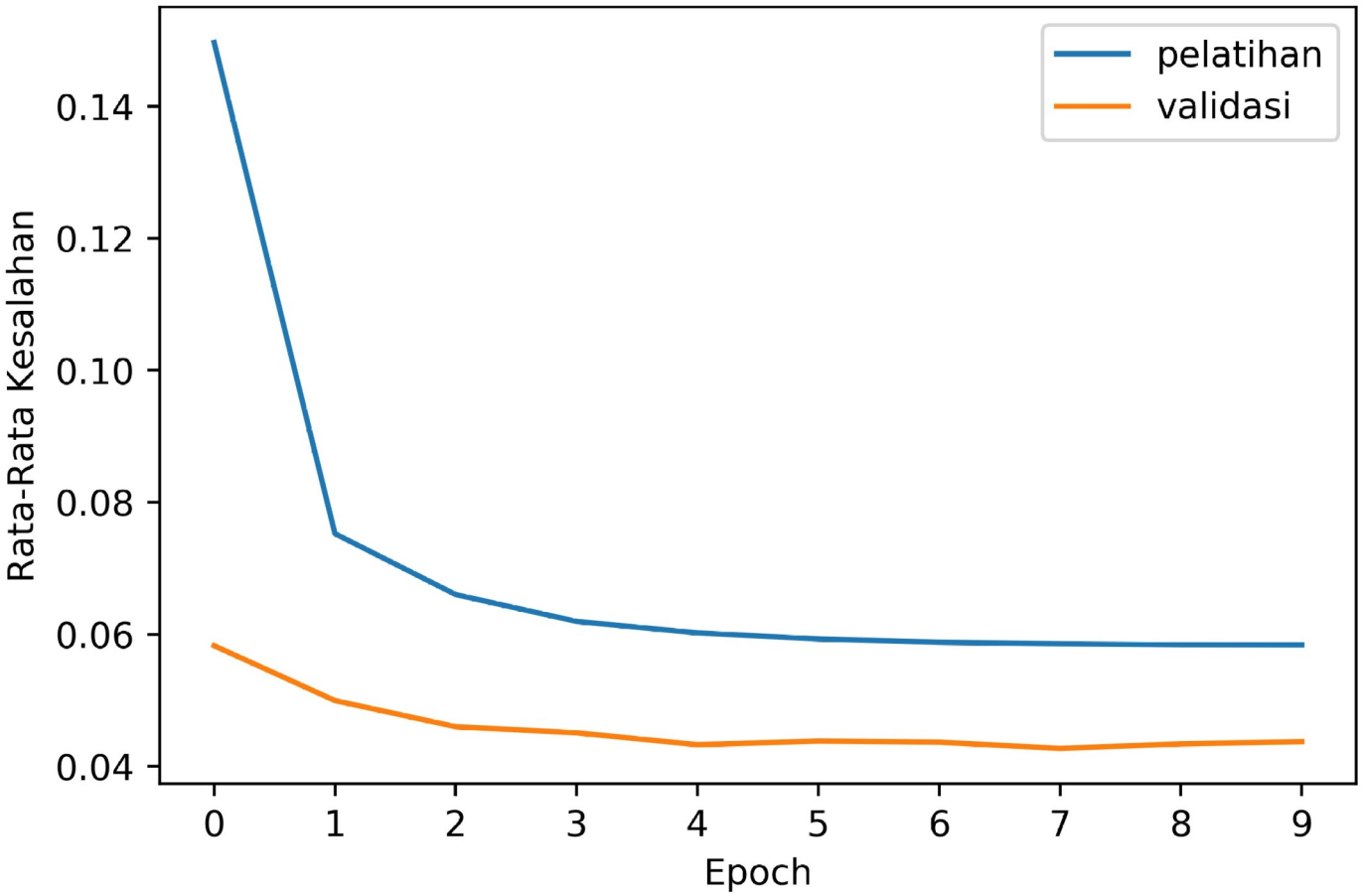
PRA PEMROSESAN DATA



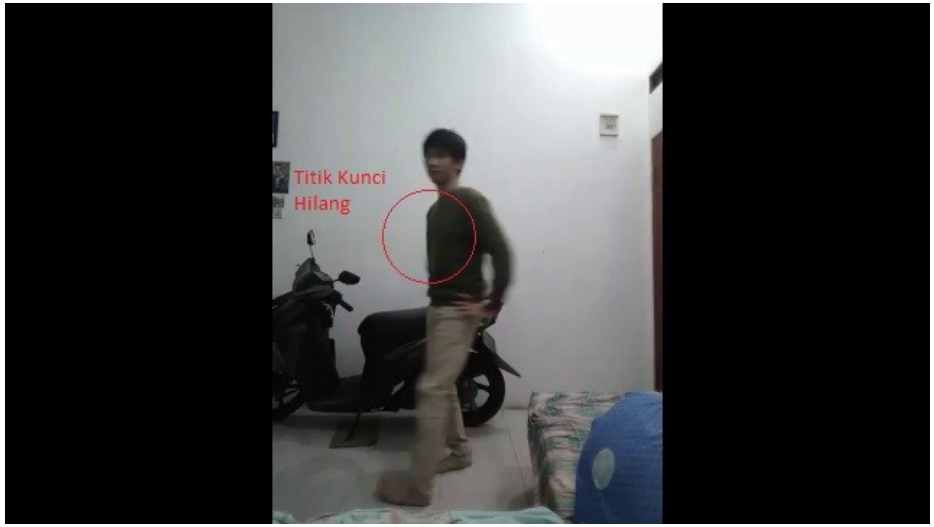
PELATIHAN MODEL

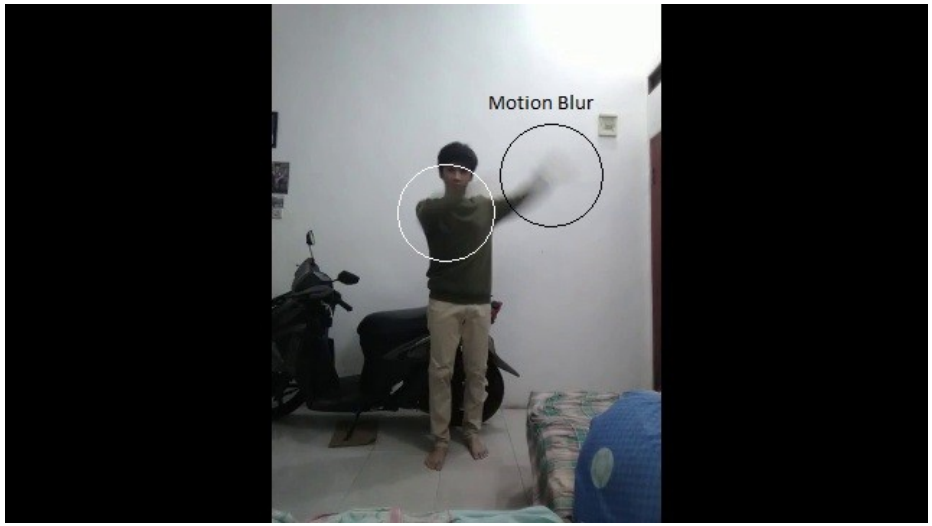


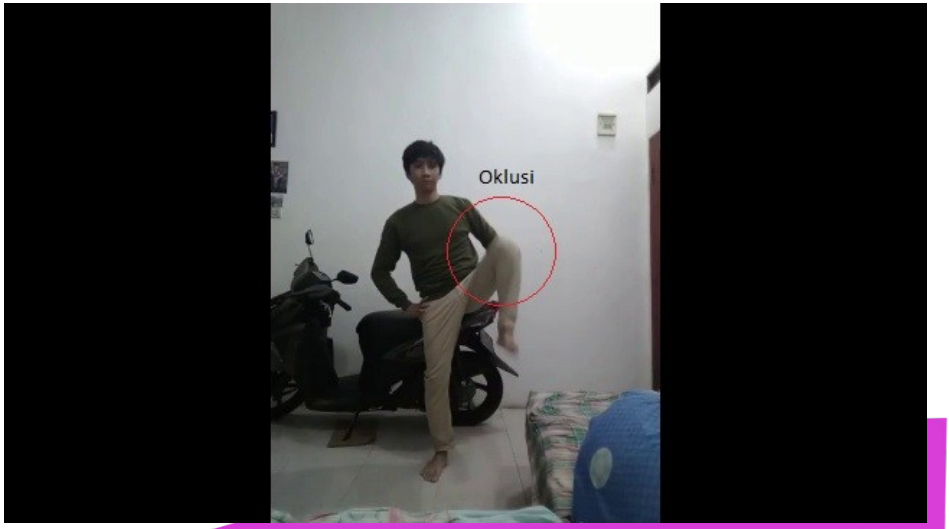
HASIL PELATIHAN



ANALISIS DATA INPUT



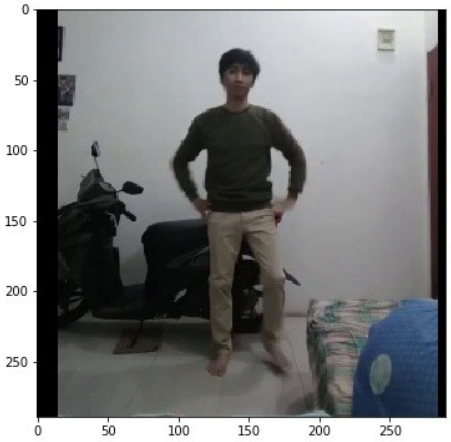




OpenPose

Cao et al. Openpose: Realtime multi-person 2d pose estimation using part affinity fields.IEEE Transactions on Pattern Analysis and Machine Intelligence.

UJI COBA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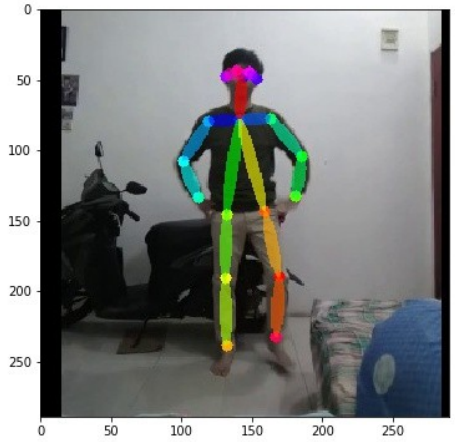
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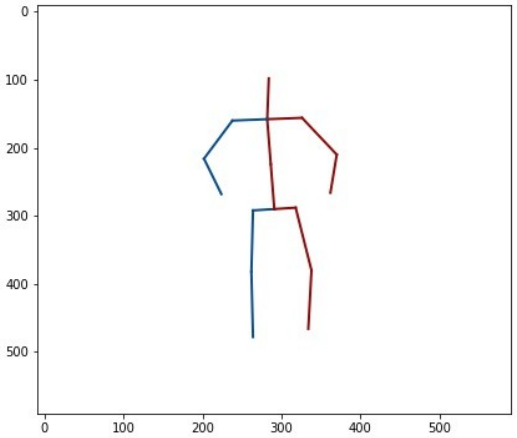
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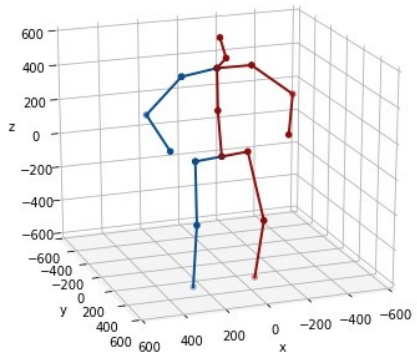
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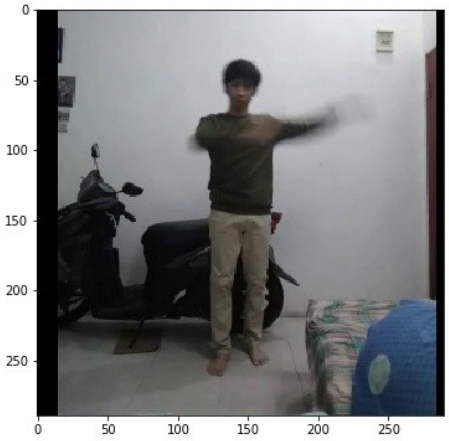
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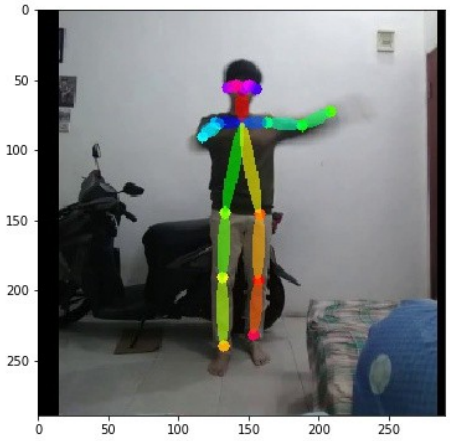
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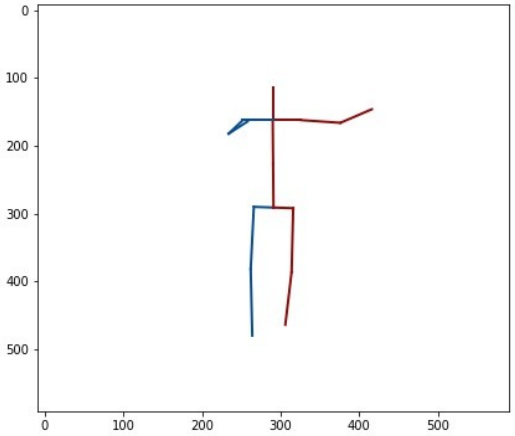
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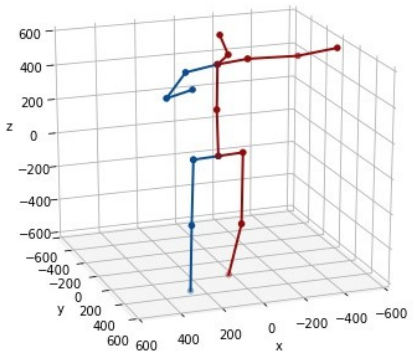
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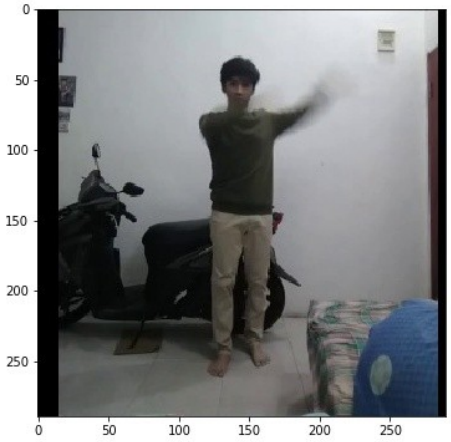
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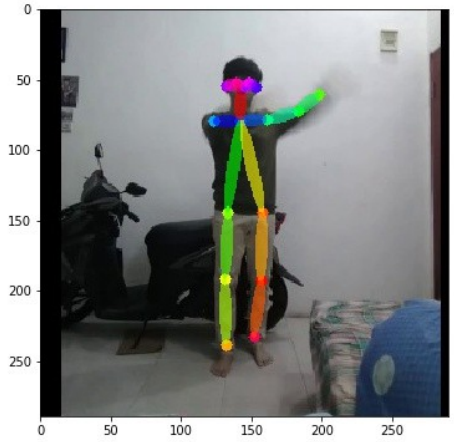
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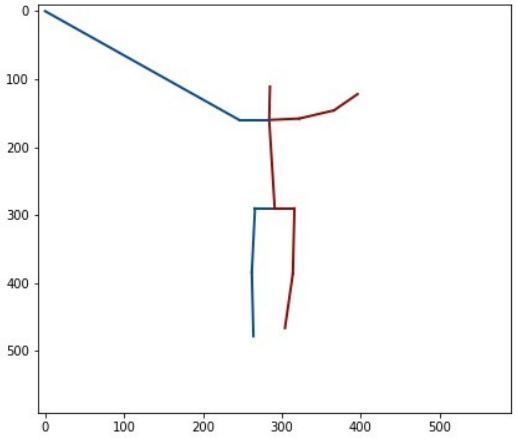
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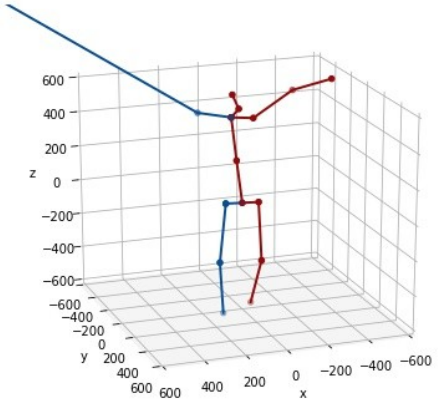
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ANALISIS


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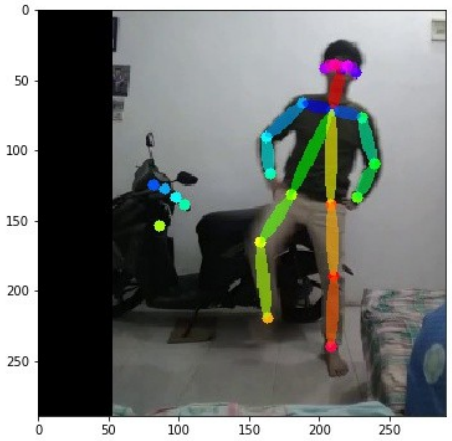
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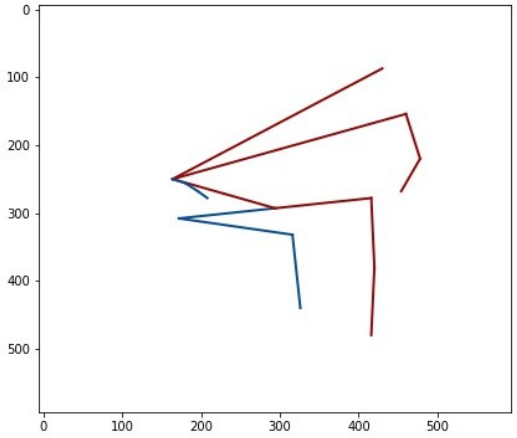
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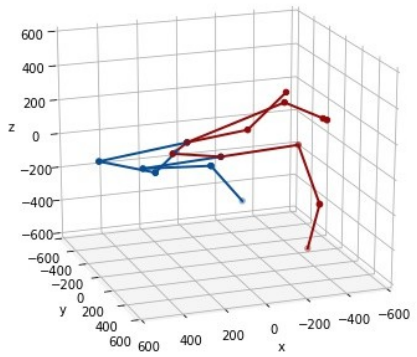
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PENUTUP

KESIMPULAN:

- Aplikasi estimasi pose tiga dimensi menggunakan modeldeep neuralnetworkberhasil dilatih
- Model melakukan pemelajaran secara mandiri menggunakan data pose 2D sebagai input dan pose 3D sebagai output dengan hasil 0.0437
- Model deep neural networkini masih minimalis, data dengan satu domain, dan memiliki tahapan yang tidak efisien

SARAN:

- Menggunakan model yang lebih kompleks
- Data dengan domain yang lebih luas seperti estimasi pose pada hewan tertentu.