



Deploying deep learning model using flask api

Keras, Tensorflow, Flask

Table of contents

- 01 Machine learning**
Pengenalalan
- 02 models**
VGG, Inception, and ResNet
- 03 Configure dev env**
Python, Keras, Tensorflow
- 04 Deploying deep learning**
Flask API



Goal

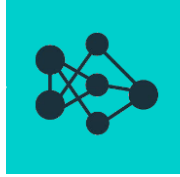
- Memahami system kerja Machine Learning
- Menggunakan Model machine learning
- Membuat API flask untuk model tersebut



01

Machine Learning

Pengenalan



01

Model

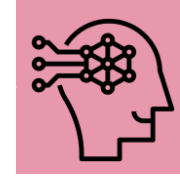
Bagaimana memilih
model yang sesuai



02

Dataset

Bagaimana
mementukan
dataset/feature

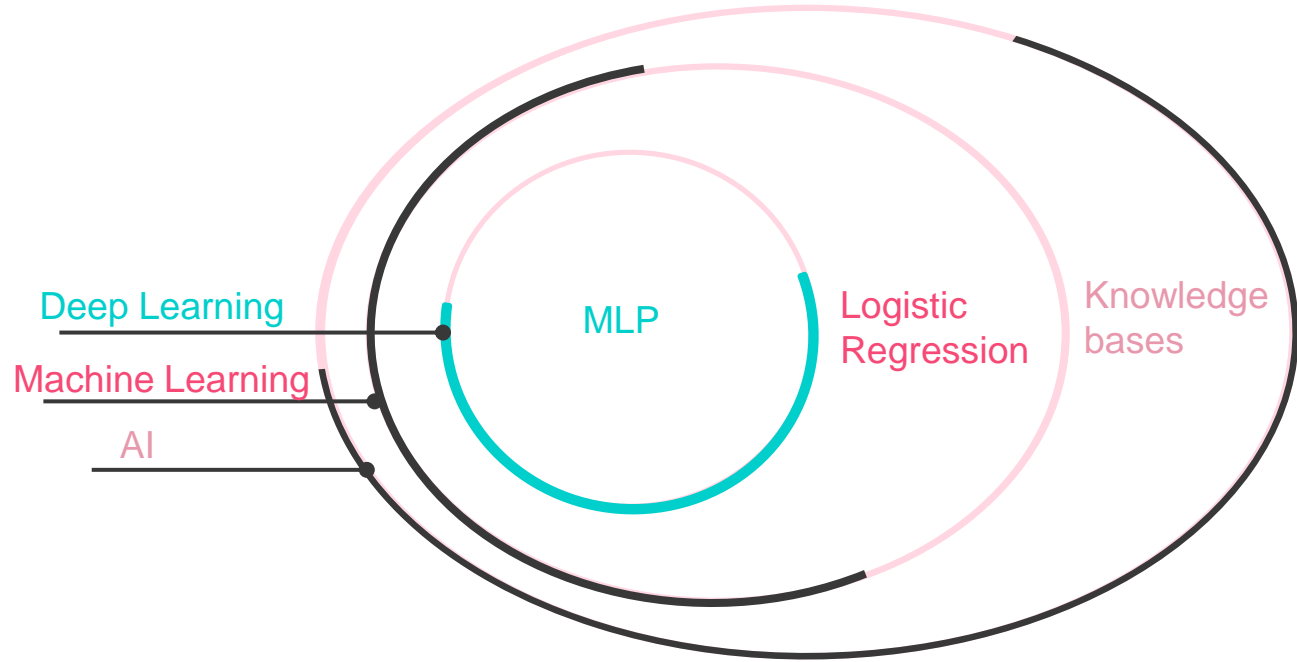


03

Training

Model training

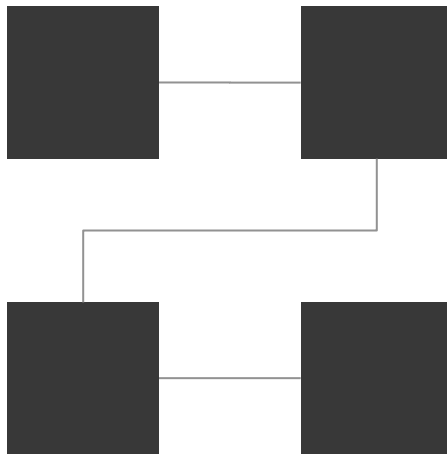
DEEP LEARNING



DEVELOP MODEL

IDENTIFIKASI GOAL
Identifikasi masalah dan
metric keberhasilan

**TRAIN, TUNE,
EVALUASI**
Training, tune dan
evaluasi model



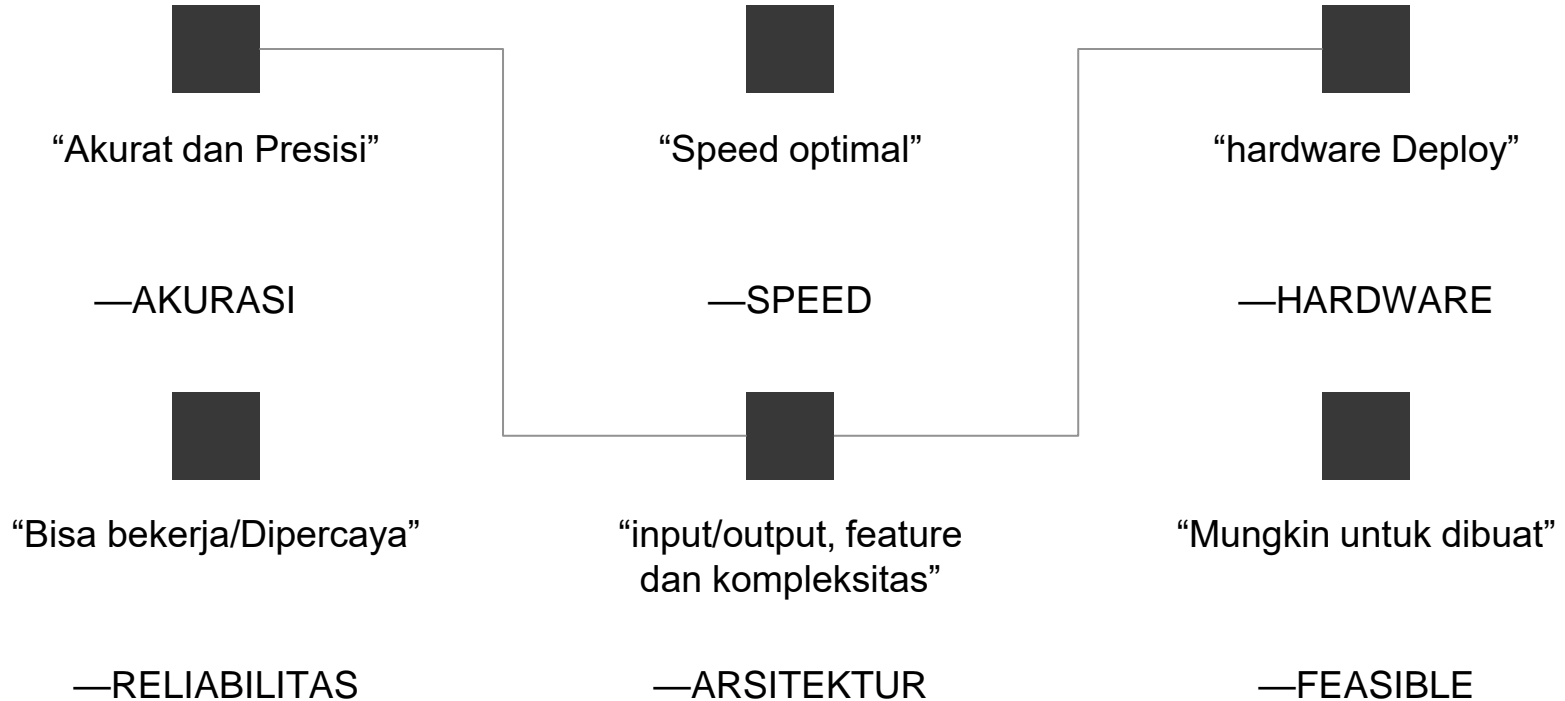
**MENGUMPULKAN
DATA**

Mengumpulkan data
dan mencari model
(arsitektur)

DEPLOY

Deploy model ke
lingkungan bisnis
seusungguhnya

METRIC MENENTUKAN MODEL





02

model

Machine learning model

A mostly complete chart of Neural Networks

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Backfed Input Cell

Input Cell

Noisy Input Cell

Hidden Cell

Probabilistic Hidden Cell

Spiking Hidden Cell

Output Cell

Match Input Output Cell

Recurrent Cell

Memory Cell

Different Memory Cell

Kernel

Convolution or Pool

Perceptron (P)



Feed Forward (FF)



Radial Basis Network (RBF)



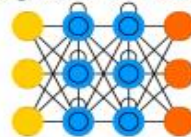
Deep Feed Forward (DFF)



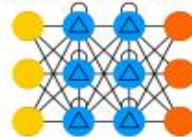
Recurrent Neural Network (RNN)



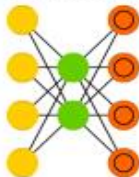
Long / Short Term Memory (LSTM)



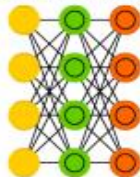
Gated Recurrent Unit (GRU)



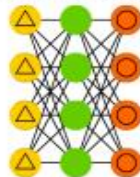
Auto Encoder (AE)



Variational AE (VAE)



Denoising AE (DAE)



Sparse AE (SAE)



Markov Chain (MC)



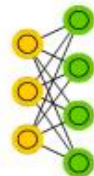
Hopfield Network (HN)



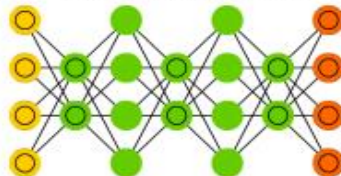
Boltzmann Machine (BM)



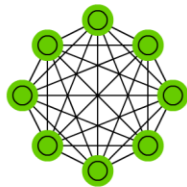
Restricted BM (RBM)



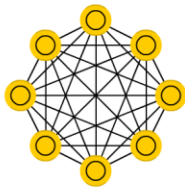
Deep Belief Network (DBN)



Markov Chain (MC)



Hopfield Network (HN)



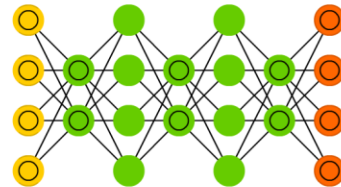
Boltzmann Machine (BM)



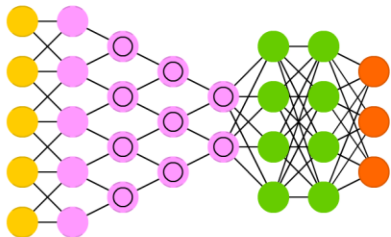
Restricted BM (RBM)



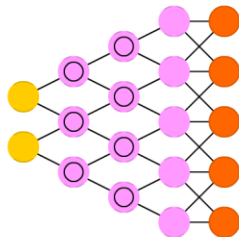
Deep Belief Network (DBN)



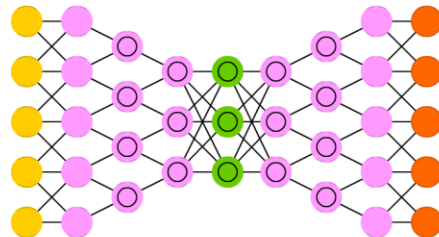
Deep Convolutional Network (DCN)



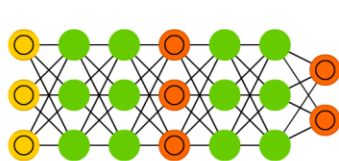
Deconvolutional Network (DN)



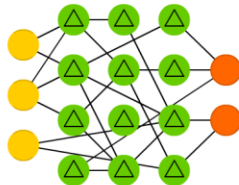
Deep Convolutional Inverse Graphics Network (DCIGN)



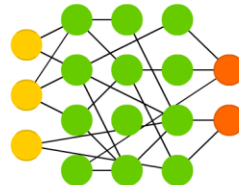
Generative Adversarial Network (GAN)



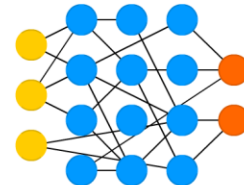
Liquid State Machine (LSM)



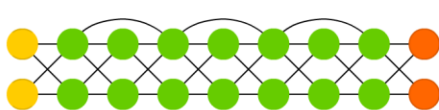
Extreme Learning Machine (ELM)



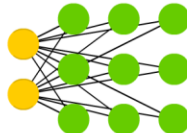
Echo State Network (ESN)



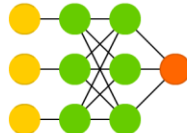
Deep Residual Network (DRN)



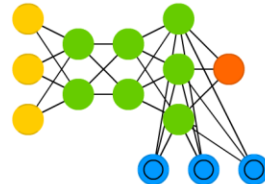
Kohonen Network (KN)



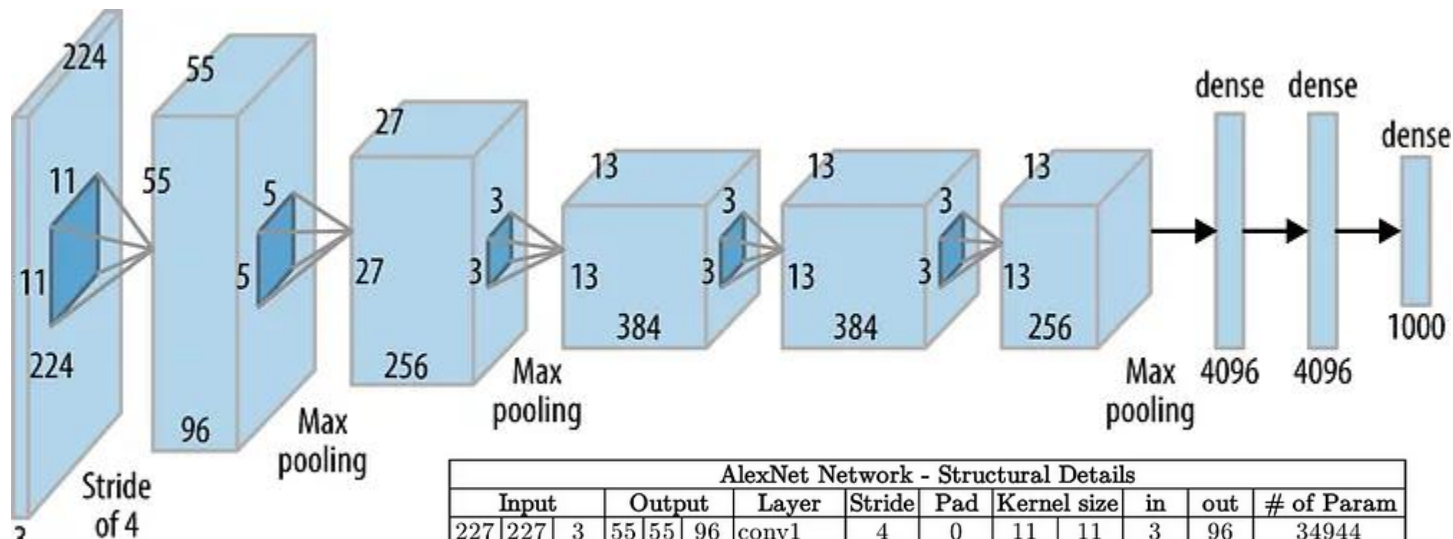
Support Vector Machine (SVM)



Neural Turing Machine (NTM)

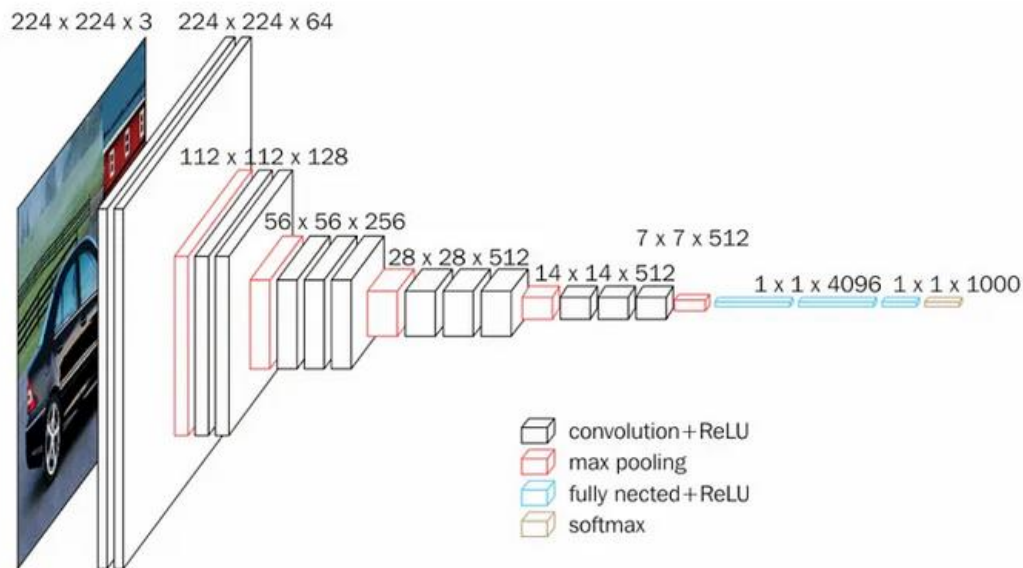


AlexNet



AlexNet Network - Structural Details													
Input			Output			Layer	Stride	Pad	Kernel size		in	out	# of Param
227	227	3	55	55	96	conv1	4	0	11	11	3	96	34944
55	55	96	27	27	96	maxpool1	2	0	3	3	96	96	0
27	27	96	27	27	256	conv2	1	2	5	5	96	256	614656
27	27	256	13	13	256	maxpool2	2	0	3	3	256	256	0
13	13	256	13	13	384	conv3	1	1	3	3	256	384	885120
13	13	384	13	13	384	conv4	1	1	3	3	384	384	1327488
13	13	384	13	13	256	conv5	1	1	3	3	384	256	884992
13	13	256	6	6	256	maxpool5	2	0	3	3	256	256	0
						fc6			1	1	9216	4096	37752832
						fc7			1	1	4096	4096	16781312
						fc8			1	1	4096	1000	4097000
Total												62,378,344	

VGGNet



VGG16 Block Diagram (source: neurohive.io)

[illegible]


```

graph BT
    PL[Previous layer] --> C1_1[1x1 convolutions]
    PL --> C1_2[1x1 convolutions]
    PL --> MP[3x3 max pooling]
    C1_1 --> C3_3[3x3 convolutions]
    C1_2 --> C5_5[5x5 convolutions]
    MP --> C1_3[1x1 convolutions]
    C3_3 --> FC[Filter concatenation]
    C5_5 --> FC
    C1_3 --> FC

```

Input - Structural Details															
Input Image	in	out	Layer	Input Layer	Stride	Pd	Kernel	in	out	Param					
input (b)	112	112	conv1	conv1	1	0	3	3	112	112	0				
	112	112	conv1	conv1	2	0.5	3	3	64	64	0				
	56	56	conv1	maxpool1	1	0	1	1	64	64	1160				
	56	56	conv1	maxpool1	1	0	1	1	64	16	116720				
input (b)	28	192	conv1	conv1	2	0.5	3	3	192	192	0				
	28	192	conv1	maxpool2	0	1	1	1	192	96	18528				
	28	192	conv1	maxpool2	0	1	1	3	192	96	18528				
	28	192	conv1	maxpool2	0	1	1	1	192	64	13152				
input (b)	28	192	conv1	maxpool2	0	1	1	3	192	64	110720				
	28	16	conv1	conv2	1	2	5	5	16	28	12832				
	28	16	conv1	conv2	1	2	5	5	16	28	12832				
	28	192	conv1	conv2	0	1	1	1	192	32	98304				
input (b)	28	256	depthconv	conv2	conv2	conv2	conv2	0	1	1	256	128	8224		
	28	128	conv1	depthconv	conv2	conv2	conv2	0	1	1	128	32	3280		
	28	128	conv1	depthconv	conv2	conv2	conv2	0	1	1	128	32	3280		
	28	128	conv1	depthconv	conv2	conv2	conv2	0	1	1	128	32	3280		
input (b)	28	86	conv1	conv2-3	conv2	conv2	conv2	1	3	3	128	194	221376		
	28	86	conv1	conv2-3	conv2	conv2	conv2	1	3	3	128	194	221376		
	28	192	conv1	conv2-3	conv2	conv2	conv2	1	3	3	128	194	221376		
	28	192	conv1	conv2-3	conv2	conv2	conv2	1	3	3	128	194	221376		
input (b)	28	192	conv1	maxpool-4	conv2	conv2	conv2	0	1	1	256	64	18448		
	28	192	conv1	maxpool-4	conv2	conv2	conv2	0	1	1	256	64	18448		
	28	192	conv1	maxpool-4	conv2	conv2	conv2	0	1	1	256	64	18448		
	28	192	conv1	maxpool-4	conv2	conv2	conv2	0	1	1	256	64	18448		
input (b)	28	148	conv1	depthconv	conv2	conv2	conv2	2	0.5	3	148	480	0		
	14	148	conv1	maxpool3	1	0	1	3	148	480	96	4176			
	14	148	conv1	maxpool3	1	0	1	3	148	480	96	4176			
	14	148	conv1	maxpool3	1	0	1	1	148	192	92352				
input (b)	14	148	conv1	maxpool3	1	0	1	1	148	192	92352				
	14	14	conv1	conv2	1	2	5	5	14	14	48	19248			
	14	14	conv1	conv2	1	2	5	5	14	14	48	19248			
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
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input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
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	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
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	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
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	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
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	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
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input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
input (b)	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1	148	64	8784		
	14	14	conv1	depthconv	conv2	conv2	conv2	0	1	1					

Compare

Comparison					
Network	Year	Salient Feature	top5 accuracy	Parameters	FLOP
AlexNet	2012	Deeper	84.70%	62M	1.5B
VGGNet	2014	Fixed-size kernels	92.30%	138M	19.6B
Inception	2014	Wider - Parallel kernels	93.30%	6.4M	2B
ResNet-152	2015	Shortcut connections	95.51%	60.3M	11B

APLIKASI AI

INPUT

MODEL

OUTPUT

VERIFIKASI WAJAH

Menemukan kemiripan wajah dari database

CUACA TERKINI

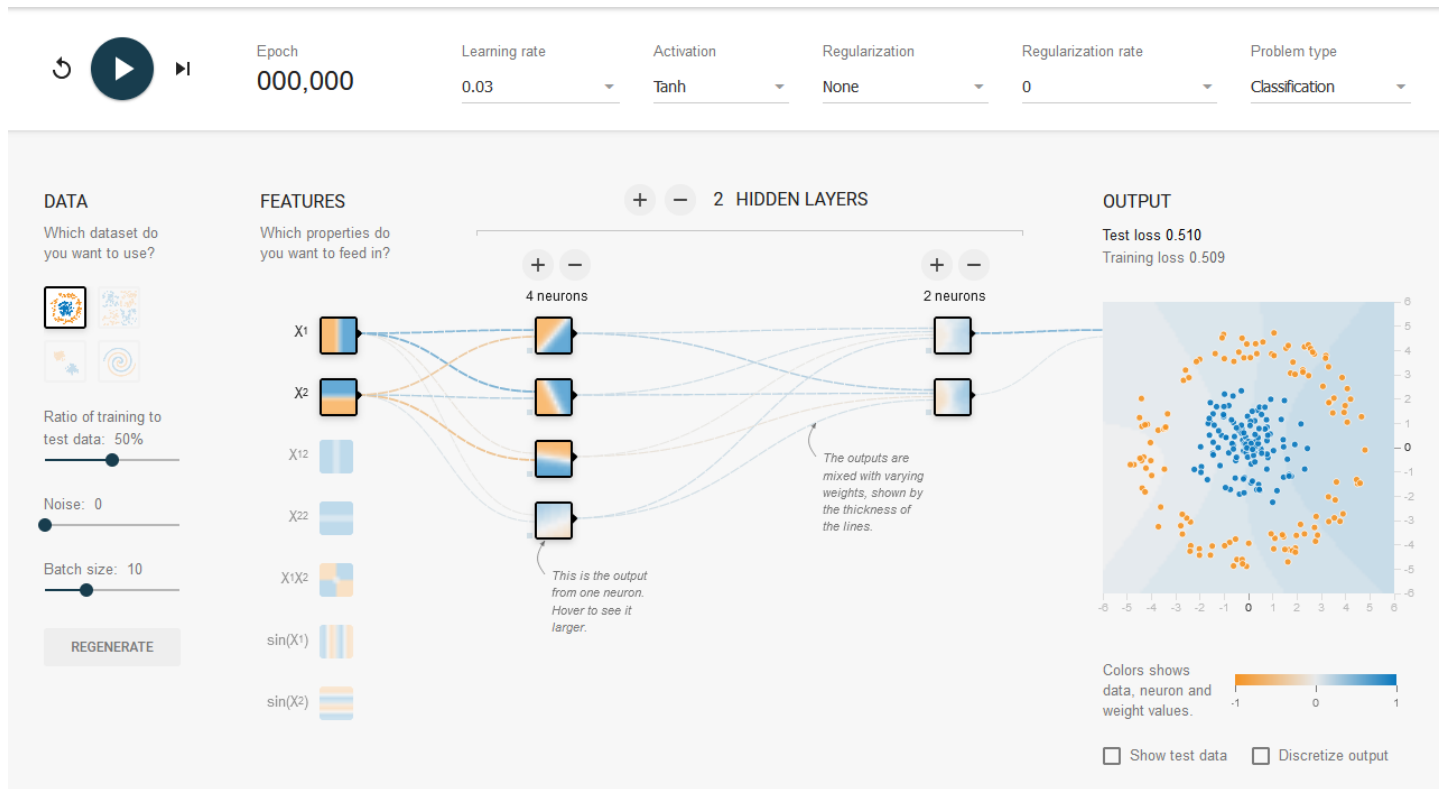
Kondisi Cuaca Terkini (Cerah, Berawan, Hujan, Hujan Petir)

PREDIKSI HARGA
RUMAH

Prediksi harga barang

Training

<https://playground.tensorflow.org/>

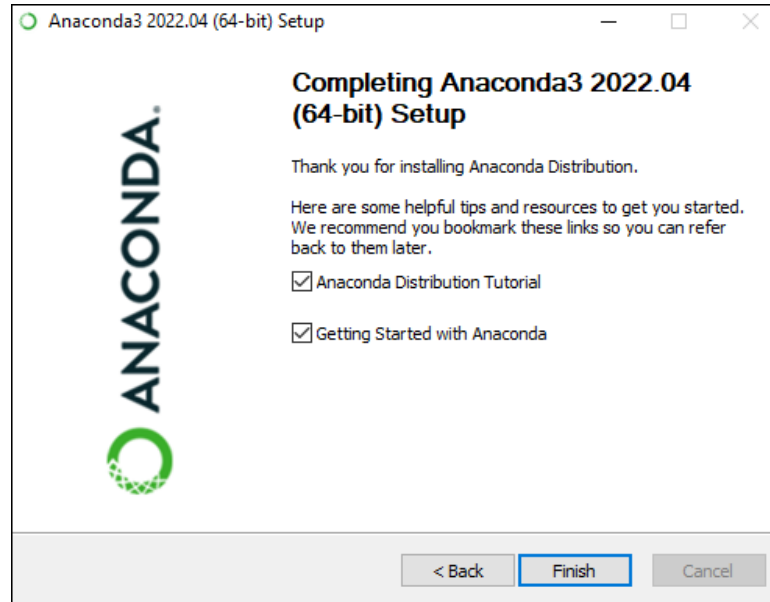


Configure dev env

Virtual env using anaconda

Install anaconda

<https://www.anaconda.com/download>



Create virtual env

The screenshot displays the Anaconda Navigator application window. The top bar includes the 'File' and 'Help' menus, the 'ANACONDA.NAVIGATOR' logo, and buttons for 'Upgrade Now' and 'Sign in'. The left sidebar contains navigation options: 'Home', 'Environments' (selected), 'Learning', and 'Community'. Below these are links to 'Anaconda Notebooks', 'A Full Python IDE directly from the', 'Documentation', and 'Anaconda Blog'. The main panel shows the 'base (root)' environment selected. A table lists installed packages with their names, descriptions, and versions. At the bottom, there are buttons for 'Create', 'Clone', 'Import', and 'Remove', and a note that 370 packages are available.














Name	Description	Version
✓ _ipyw_jlab_nb_ex...		0.1.0
✓ absl-py		1.4.0
✓ alabaster		0.7.12
✓ anaconda		2020.11
✓ anaconda-client		1.7.2
✓ anaconda-project		0.8.4
✓ argh		0.26.2
✓ argon2-cffi		20.1.0
✓ asn1crypto		1.4.0
✓ astroid		2.4.2
✓ astropy		4.0.2
✓ astunparse		1.6.3
✓ async-generator		1.10

370 packages available

Buat dan atur virtual environment dari Anaconda Navigator

Install Dev env

Applications on base (root) Channels

 CMD.exe Prompt 0.1.1 Run a cmd.exe terminal with your current environment from Navigator activated Launch	 Datalore Online Data Analysis Tool with smart coding assistance by JetBrains. Edit and run your Python notebooks in the cloud and share them with your team. Launch	 IBM Watson Studio Cloud IBM Watson Studio Cloud provides you the tools to analyze and visualize data, to cleanse and shape data, to create and train machine learning models. Prepare data and build models, using open source data science tools or visual modeling. Launch	 JupyterLab 2.2.6 An extensible environment for interactive and reproducible computing, based on the Jupyter Notebook and Architecture. Launch	 Notebook 6.1.4 Web-based, interactive computing notebook environment. Edit and run human-readable docs while describing the data analysis. Launch	 Powershell Prompt 0.0.1 Run a Powershell terminal with your current environment from Navigator activated Launch
 Qt Console 4.7.7 PyQt GUI that supports inline figures, proper multiline editing with syntax highlighting, graphical calltips, and more. Launch	 Spyder 4.1.5 Scientific Python Development Environment. Powerful Python IDE with advanced editing, interactive testing, debugging and introspection features Launch	 VS Code 1.80.2 Streamlined code editor with support for development operations like debugging, task running and version control. Launch	 Glueviz 1.0.0 Multidimensional data visualization across files. Explore relationships within and among related datasets. Install	 Orange 3 3.26.0 Component based data mining framework. Data visualization and data analysis for novice and expert. Interactive workflows with a large toolbox. Install	 PyCharm Professional A Full-fledged IDE by JetBrains for both Scientific and Web Python development. Supports HTML, JS, and SQL. Install
 RStudio 1.1.456 A set of integrated tools designed to help you be more productive with R. Includes R essentials and notebooks. Launch					



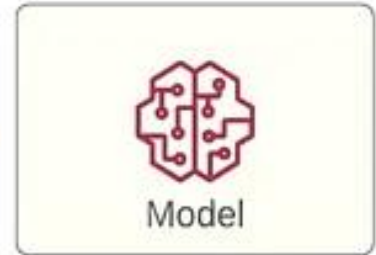
04

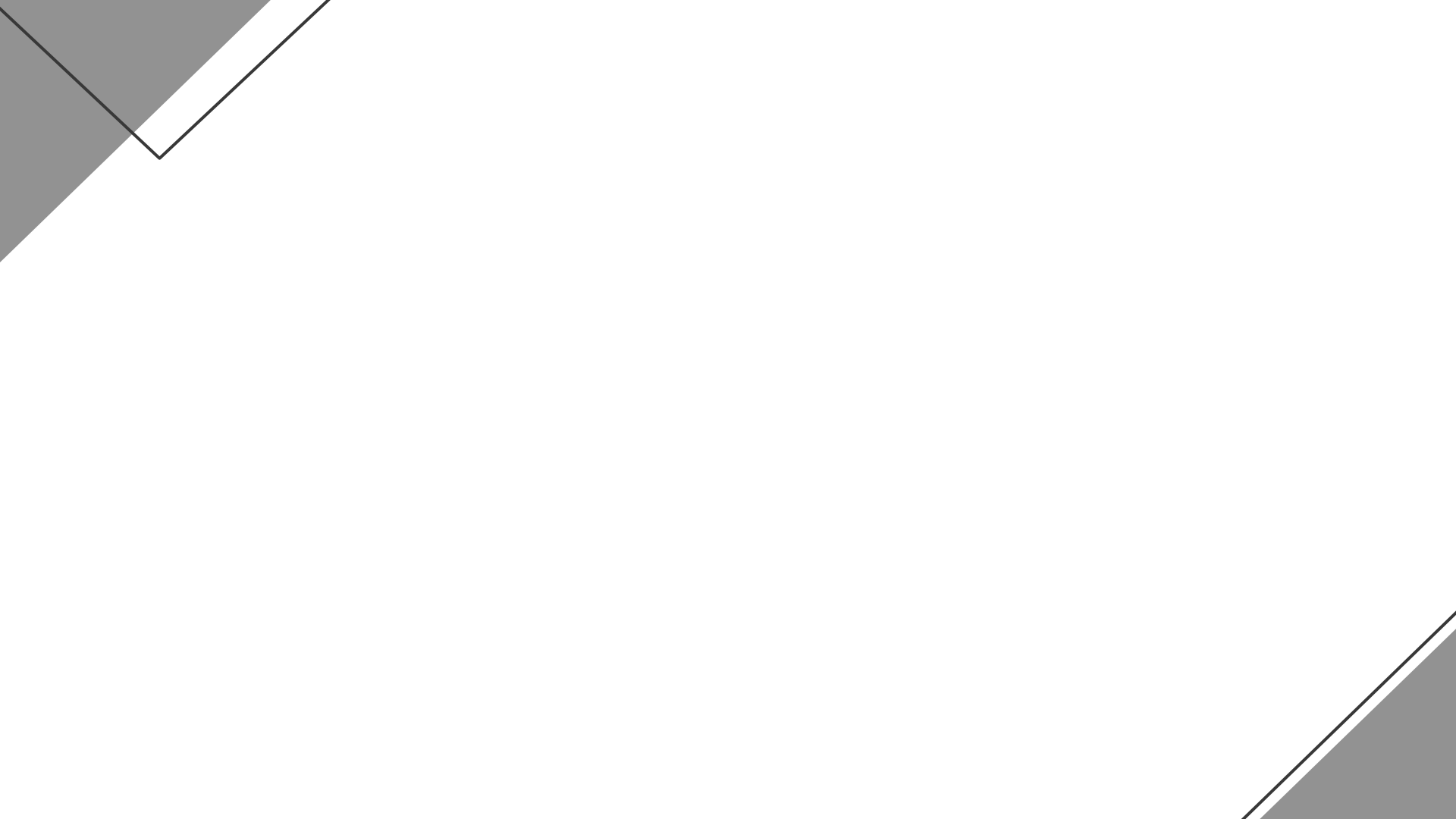
Deploying deep learning model

Flask webapp
deployment

Install Keras

`pip install keras flask gevent requests pillow`





Thanks

Do you have any question?

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