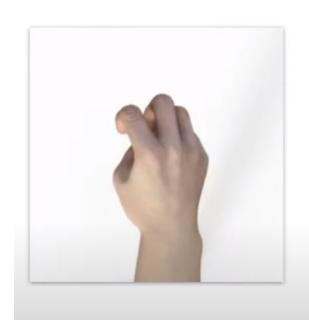
Gentle Introduction to Deep Learning

Nat Min Gyi@Thinkers Institute



The following materials are from Machine Learning Zero to Hero(Google I/O'19) by Laurence Moroney https://www.youtube.com/watch?v=VwVg9jCtqaU&t=361s















```
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ploom",g).g.addEventListener("loom",g,il).setTimeout(t,iS))try(u.submit())catch(h)/var.
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plument("form").submit(m.apply(w)))finally(w.setAttribute("action",il).w.setAttribute("enctype",c).r?
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           arget",r):f.removeAttr("target"),e(l).remove())}function.s(t){if(x.aborted66:F){if(M-n(g),M]|{a("cannot.access.
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ject(x,"error","server.abort");if(M66M.location.hrefi-m.iframeSrc);T){g.detachEvent7
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           cess.call(m.context,E,"success",x),S.resolve(x.responseText,"success",x),656e.event.trigger("ajaxSuccess",
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        t.trigger("ajaxStop"), m.complete//m.complete.call(m.context, x, i), F=1
         orTimeout(j),setTimeout(function(){m.iframeTarget?v.attr("src",m.iframeSrc):v.remove(),x.responseDRL-null],100)}}}
         ,x,y,b,T,j,w=f(0),S=e.Deferred();if(S.mbort=function(e){x.mbort(e)},r)for(l=0;l-h.length;l++)c=e(h(l)),i7
        , |1):c.removeAttr("disabled");if(s=e.extend(|0,{},e.s)sxSettings,t),s.context-s.context||s,p-"jqFormIO"+(nov
    rotate3d(0,0,1,-1deg);transform:translate3d(-54,0,0).rotate3d(0,0,1,-1deg))1004(-uebkit-transform:none;transfor
```





Data and Labels



Label = Rock



10010100111110101011 1010101111010101111010 101011111010101011111 1110001111010101

Label = Scissors



Label = Paper

Lots of pictures of each

Simple Example

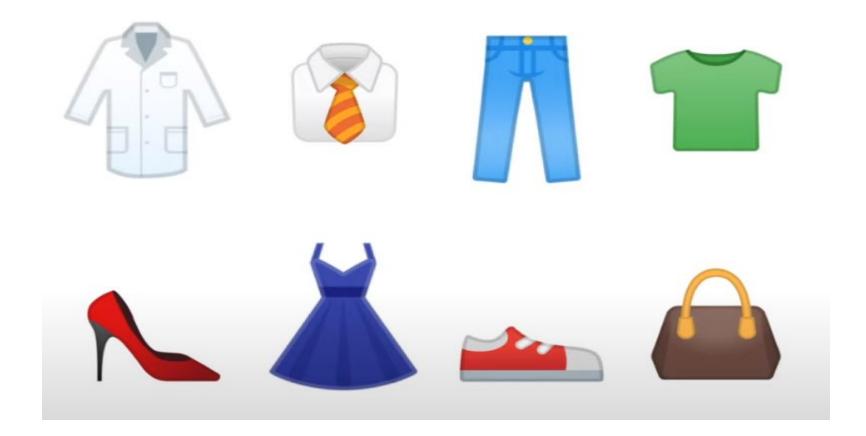
$$X = -1$$
, 0, 1, 2, 3, 4
 $Y = -3$, -1, 1, 3, 5, 7

What is the relationship between Xs and Ys???

$$X = -1$$
, 0, 1, 2, 3, 4
 $Y = -3$, -1, 1, 3, 5, 7
 $Y = 2X - 1$

```
xs = np.array([-1.0, 0.0, 1.0, 2.0, 3.0, 4.0], dtype=float)
ys = np.array([-3.0, -1.0, 1.0, 3.0, 5.0, 7.0], dtype=float)
model = tf.keras.Sequential([keras.layers.Dense(units=1, input_shape=[1])])
(အရိုးရှင်းဆုံး neural network, layer ၁ခုတည်း, neuron တခုတည်း ရှိမယ်, value တခုထဲ ထည့်ပေးမယ်)
model.compile(optimizer='sgd', loss='mean squared error')
model.fit(xs, ys, epochs=500)
print(model.predict([10.0]))
```

How to see and recognize images (Basic Computer Vision with ML)

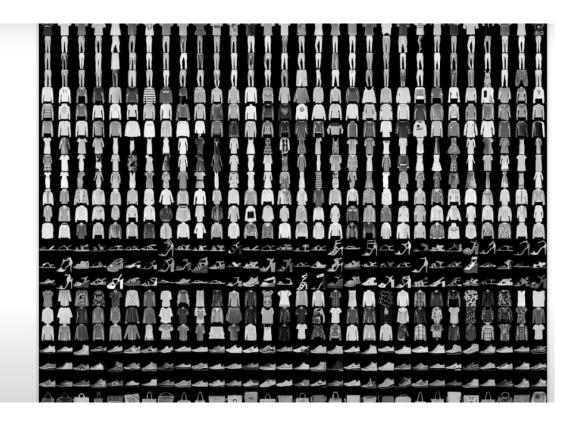


Learn from experience



Fashion MNIST

- 70k Images
- 10 Categories
- Images are 28x28
- Can train a neural net!



import tensorflow as tf from tensorflow import keras

```
model = tf.keras.models.Sequential([

tf.keras.layers.Flatten(input_shape=(28,28)),

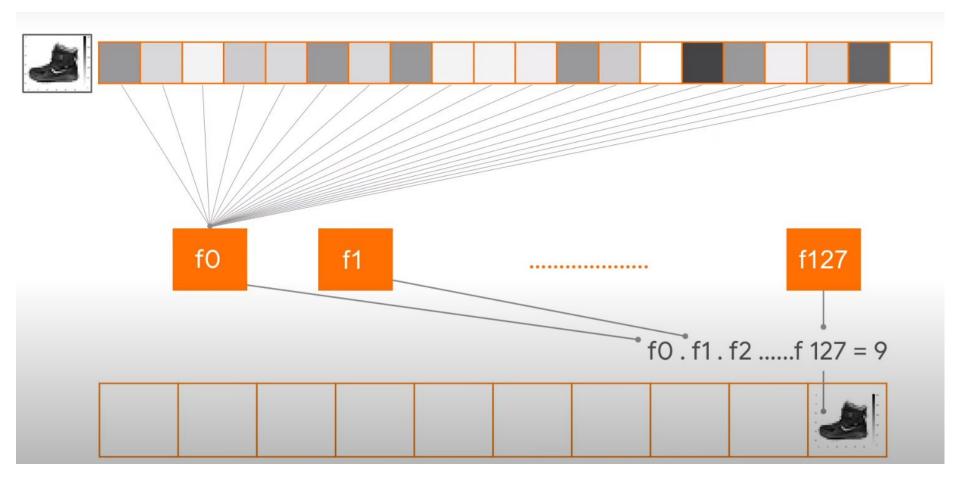
tf.keras.layers.Dense(128, activation=tf.nn.relu), (ລຸງຄ ຕ ລາວດັ)

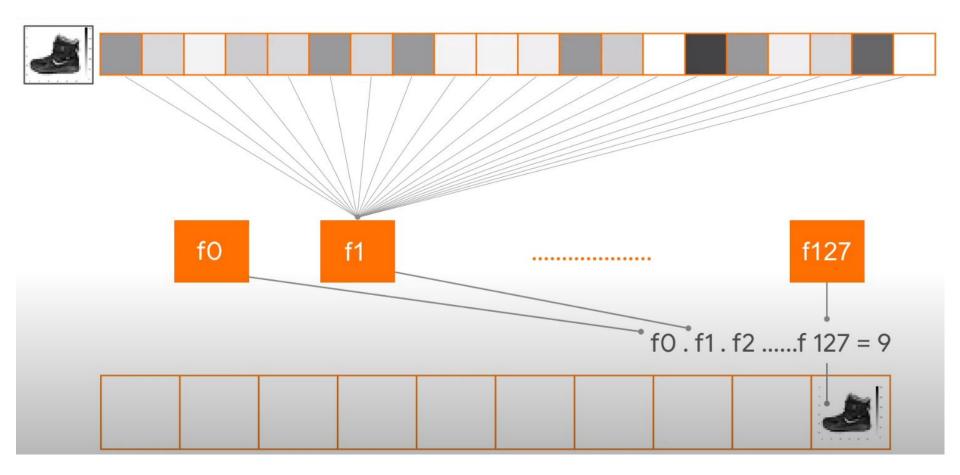
tf.keras.layers.Dense(10, activation=tf.nn.softmax)])

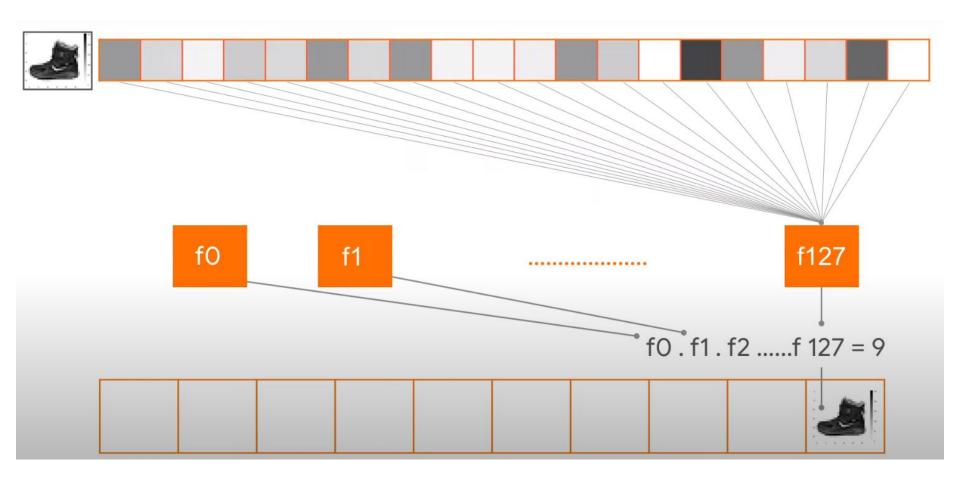
model.compile(optimizer = tf.keras.optimizers.Adam(),

loss = 'sparse_categorical_crossentropy',

metrics=['accuracy'])
```







```
model.compile(optimizer = tf.keras.optimizers.Adam(),
loss = 'sparse_categorical_crossentropy',)
```

model = tf.keras.models.Sequential([

tf.keras.layers.Flatten(input_shape=(28,28)),

tf.keras.layers.Dense(128, activation=tf.nn.relu),

tf.keras.layers.Dense(10, activation=tf.nn.softmax)])

0.02	0.01	0.01	0.05	0.01	0.06	0.09	0.01	0.92
0	0	0	0	0	0	0	0	1.0

```
model.fit(training_images, training_labels, epochs=5)

test_loss, test_acc = model.evaluate(test_image, test_labels)

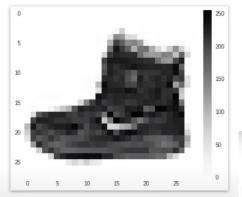
(train မလုပ်ရသေးတဲ့ ပုံ ၁၀၀၀ ကို စမ်းမှာ)

predictions = model.predict(my_images)
```

Limitations

GrayScale Image and Image must be centered!

Convolutional Neural Network!!!



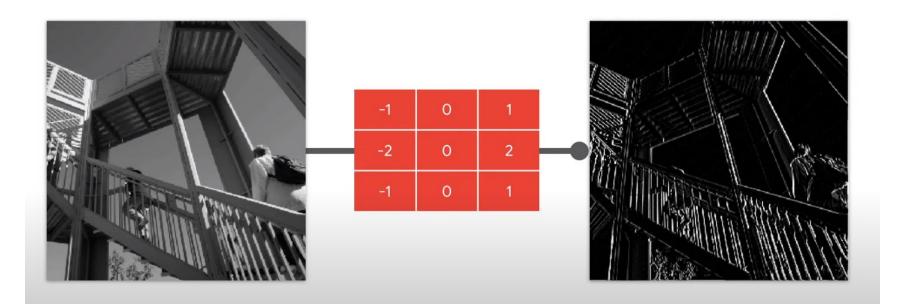


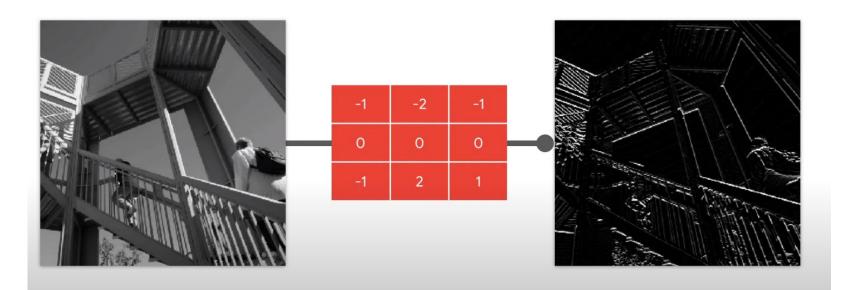
Current pixel value is 192
Consider neighbor values

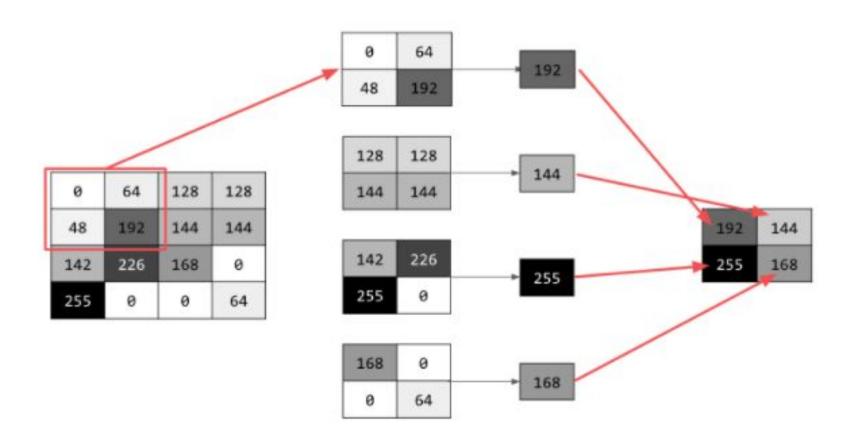
Filter definition

CURRENT_PIXEL_VALUE = 192

NEW_PIXEL_VALUE =
$$(-1 * 0) + (0 * 64) + (-2 * 128) + (.5 * 48) + (4.5 * 192) + (-1.5 * 144) + (1.5 * 42) + (2 * 226) + (-3 * 168)$$



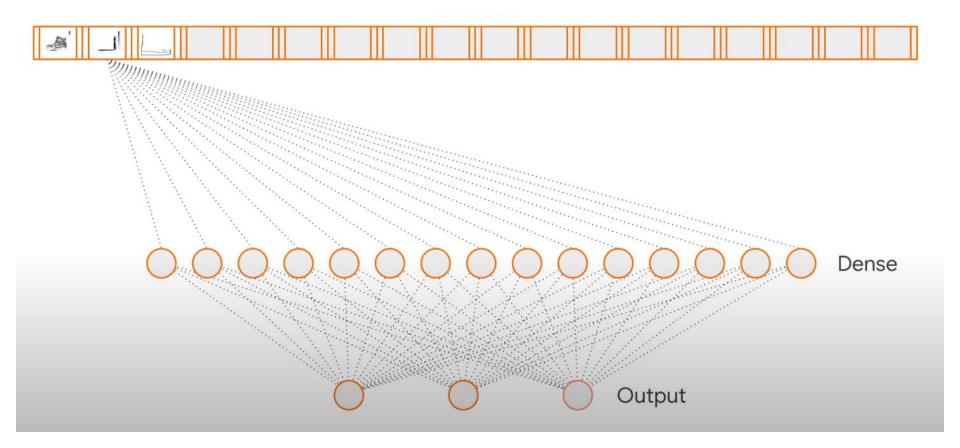






Max pooling 2x2





Data and Labels



Label = Rock



10010100111110101011 1010101111010101111010 101011111010101011111 1110001111010101

Label = Scissors



Label = Paper

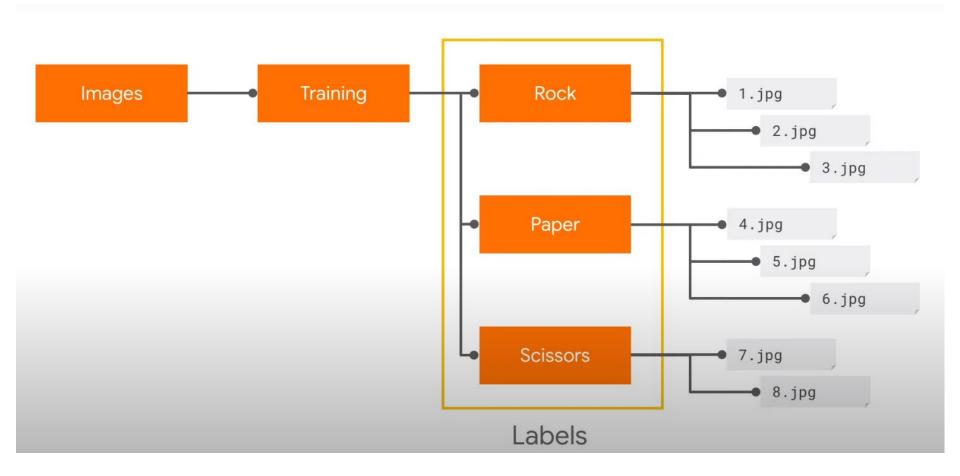
Lots of pictures of each

```
!wget --no-check-certificate \
   https://storage.googleapis.com/laurencemoroney-blog.appspot.com/rps.zip \
   -O /tmp/rps.zip
 !wget --no-check-certificate \
   https://storage.googleapis.com/laurencemoroney-blog.appspot.com/rps-test-set.zip \
   -O /tmp/rps-test-set.zip
import os
import zipfile
local zip = '/tmp/rps.zip'
zip ref = zipfile.ZipFile(local zip, 'r')
zip ref.extractall('/tmp/')
zip ref.close()
local zip = '/tmp/rps-test-set.zip'
```

zip ref = zipfile.ZipFile(local zip, 'r')

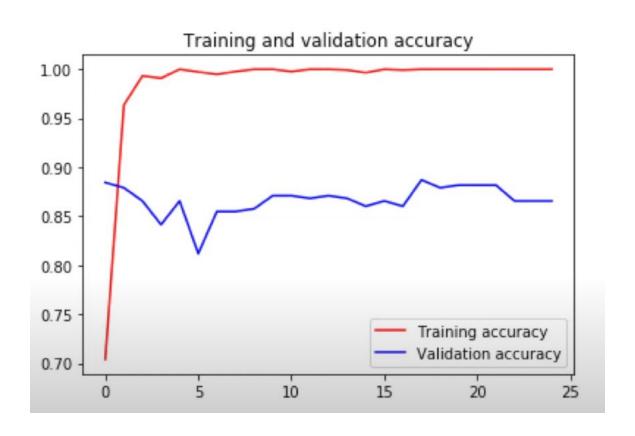
zip ref.extractall('/tmp/')

zip ref.close()



```
model = tf.keras.models.Sequential([
    tf.keras.layers.Conv2D(64, (3,3), activation='relu', input_shape=(150, 150, 3)),
    tf.keras.layers.MaxPooling2D(2, 2),
    tf.keras.layers.Conv2D(64, (3,3), activation='relu'),
    tf.keras.layers.MaxPooling2D(2,2),
    tf.keras.layers.Conv2D(128, (3,3), activation='relu'),
    tf.keras.layers.MaxPooling2D(2,2),
    tf.keras.layers.Conv2D(128, (3,3), activation='relu'),
    tf.keras.layers.MaxPooling2D(2,2),
    # Flatten the results to feed into a DNN
    tf.keras.layers.Flatten(),
    tf.keras.layers.Dropout(0.5),
    # 512 neuron hidden layer
    tf.keras.layers.Dense(512, activation='relu'),
    tf.keras.layers.Dense(3, activation='softmax')
1)
```

Overfitting



Overfitting



Vs



https://github.com/NMG-thinkers/deep_learning/

https://www.youtube.com/watch?v=r5ZlPlpkB2A &list=PLI8VZl7GXFE94K2 y31Zv9sgyj3ttDM0m

Thank you