



DATA SCIENCE BRAIN  
@datasciencebrain

# TENSORFLOW

# CHEAT SHEET

## for Deep Learning Model Building

Save for later reference



# 01

## FEEDFORWARD NEURAL NETWORK

```
model = models.Sequential()  
model.add(layers.Flatten(input_shape=(input_size,))) #  
Adjust input_size based on your data  
  
# Add hidden layers  
model.add(layers.Dense(128, activation='relu'))  
model.add(layers.Dropout(0.2)) # Optional: Add  
dropout for regularization  
  
# Add output layer  
model.add(layers.Dense(output_size,  
activation='softmax')) # Adjust output_size based on  
your problem  
  
model.compile(optimizer='adam',  
              loss='sparse_categorical_crossentropy', # Use  
'categorical_crossentropy' for one-hot encoded labels  
              metrics=['accuracy'])
```



## 02

## CONVOLUTIONAL NEURAL NETWORK

```
model = models.Sequential()  
model.add(layers.Conv2D(32, (3, 3), activation='relu',  
input_shape=(img_height, img_width, channels)))  
model.add(layers.MaxPooling2D((2, 2)))
```

```
# Add more convolutional and pooling layers as  
needed
```

```
model.add(layers.Flatten())  
model.add(layers.Dense(128, activation='relu'))  
model.add(layers.Dense(output_size,  
activation='softmax'))
```

```
model.compile(optimizer='adam',  
loss='sparse_categorical_crossentropy',  
metrics=['accuracy'])
```



## 03

## RECURRENT NEURAL NETWORK

```
model = models.Sequential()  
model.add(layers.SimpleRNN(128,  
activation='relu', input_shape=(timesteps,  
features)))  
  
# Add more recurrent layers or use LSTM/GRU  
layers  
  
model.add(layers.Dense(output_size,  
activation='softmax'))  
  
model.compile(optimizer='adam',  
              loss='sparse_categorical_crossentropy',  
              metrics=['accuracy'])
```



## 04

## LONG SHORT-TERM MEMORY

```
model = models.Sequential()  
model.add(layers.LSTM(128, activation='relu',  
input_shape=(timesteps, features)))  
  
# Add more LSTM layers if needed  
  
model.add(layers.Dense(output_size,  
activation='softmax'))  
  
model.compile(optimizer='adam',  
loss='sparse_categorical_crossentropy',  
metrics=['accuracy'])
```



## 05

## GATED RECURRENT UNIT

```
model = models.Sequential()  
model.add(layers.GRU(128, activation='relu',  
input_shape=(timesteps, features)))  
  
# Add more GRU layers if needed  
  
model.add(layers.Dense(output_size,  
activation='softmax'))  
  
model.compile(optimizer='adam',  
              loss='sparse_categorical_crossentropy',  
              metrics=['accuracy'])
```



## 06

## TRANSFER LEARNING(E.G., VGG16)

```
from tensorflow.keras.applications import VGG16
```

```
# Load pre-trained VGG16 model without the top layer  
base_model = VGG16(weights='imagenet', include_top=False,  
input_shape=(img_height, img_width, channels))
```

```
# Freeze convolutional layers  
for layer in base_model.layers:  
    layer.trainable = False
```

```
model = models.Sequential()  
model.add(base_model)
```

```
# Add custom classification layers  
model.add(layers.Flatten())  
model.add(layers.Dense(256, activation='relu'))  
model.add(layers.Dropout(0.5))  
model.add(layers.Dense(output_size, activation='softmax'))
```

```
model.compile(optimizer='adam',  
              loss='sparse_categorical_crossentropy',  
              metrics=['accuracy'])
```





**07**

## **BATCH NORMALIZATION**

```
model.add(layers.BatchNormalization())
```

**08**

## **DATA AUGMENTATION**

```
from tensorflow.keras.preprocessing.image import  
ImageDataGenerator
```

```
datagen = ImageDataGenerator(  
    rotation_range=20,  
    width_shift_range=0.2,  
    height_shift_range=0.2,  
    horizontal_flip=True,  
    shear_range=0.2  
)
```

```
datagen.fit(X_train) # X_train is your training data
```

```
model.fit(datagen.flow(X_train, y_train, batch_size=batch_size),  
epochs=epochs)
```





## 09

## EARLY STOPPING

```
from tensorflow.keras.callbacks import EarlyStopping

early_stopping = EarlyStopping(monitor='val_loss', patience=3,
                                restore_best_weights=True)

model.fit(X_train, y_train, epochs=epochs, validation_data=
(X_val, y_val), callbacks=[early_stopping])
```

## 10

## LEARNING RATE SCHEDULER

```
from tensorflow.keras.callbacks import LearningRateScheduler

def scheduler(epoch, lr):
    if epoch % 10 == 0 and epoch != 0:
        return lr * 0.9
    else:
        return lr

lr_scheduler = LearningRateScheduler(scheduler)

model.fit(X_train, y_train, epochs=epochs, validation_data=
(X_val, y_val), callbacks=[lr_scheduler])
```



## 11

## EARLY STOPPING

```

from sklearn.model_selection import GridSearchCV
from tensorflow.keras.wrappers.scikit_learn import KerasClassifier

# Define your model creation function
def create_model(optimizer='adam', hidden_units=128, dropout_rate=0.2):
    model = models.Sequential()
    model.add(layers.Flatten(input_shape=(input_size,)))

    # Add hidden layers
    model.add(layers.Dense(hidden_units, activation='relu'))
    model.add(layers.Dropout(dropout_rate))

    # Add output layer
    model.add(layers.Dense(output_size, activation='softmax'))

    model.compile(optimizer=optimizer,
                  loss='sparse_categorical_crossentropy',
                  metrics=['accuracy'])
    return model

# Create a KerasClassifier with your model creation function
model = KerasClassifier(build_fn=create_model, epochs=10, batch_size=32, verbose=0)

# Define the hyperparameters to search
param_grid = {
    'optimizer': ['adam', 'sgd', 'rmsprop'],
    'hidden_units': [64, 128, 256],
    'dropout_rate': [0.2, 0.5, 0.8]
}

# Use GridSearchCV for hyperparameter search
grid = GridSearchCV(estimator=model, param_grid=param_grid, cv=3)
grid_result = grid.fit(X_train, y_train)

# Print the best parameters and corresponding accuracy
print("Best Parameters: ", grid_result.best_params_)
print("Best Accuracy: ", grid_result.best_score_)

```



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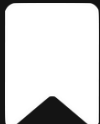
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