mini project

In [1]:

```
from tensorflow.keras.models import Sequential, Model
from tensorflow.keras.layers import *
from tensorflow import keras
from tensorflow.keras.preprocessing.image import ImageDataGenerator
from tensorflow.keras.utils import plot_model
import  tensorflow as tf

from sklearn.model_selection import train_test_split

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

In [2]:

```
def plot_loss_acc(model):
    his_df = pd.DataFrame(model.history)

    fig, axes = plt.subplots(1, 2, figsize=(12, 4))
    axes[0].plot(his_df[['acc', 'val_acc']], label = ['Training', 'Validataion'])

    axes[0].set_title('Accarcy')
    axes[0].grid(True)
    axes[0].set_xlabel('epoch')

    axes[1].plot(his_df[['loss', 'val_loss']], label = ['Training',
'Validataion'])
    axes[1].set_title('loss')
    axes[1].grid(True)
    axes[1].set_xlabel('epoch')
    plt.show()
```

In [3]:

```
tr_dir = './data/Fast Food Classification V2/Train'
val_dir = './data/Fast Food Classification V2/Valid'
te_dir = './data/Fast Food Classification V2/Test'


image_gen = ImageDataGenerator(rescale = (1/255.))
tr_gen = image_gen.flow_from_directory(tr_dir,
                                       batch_size = 32,
                                       target_size = (244, 244),
                                       class_mode = 'categorical',
                                       seed = 2020)

val_gen = image_gen.flow_from_directory(val_dir,
                                       batch_size = 32,
                                       target_size = (244, 244),
                                       class_mode = 'categorical',
                                       seed = 2020)

te_gen = image_gen.flow_from_directory(te_dir,
                                       batch_size = 32,
                                       target_size = (244, 244),
                                       class_mode = 'categorical',
                                       seed = 2020)
```

```
Found 15000 images belonging to 10 classes.
Found 3500 images belonging to 10 classes.
Found 1500 images belonging to 10 classes.
```

In [4]:

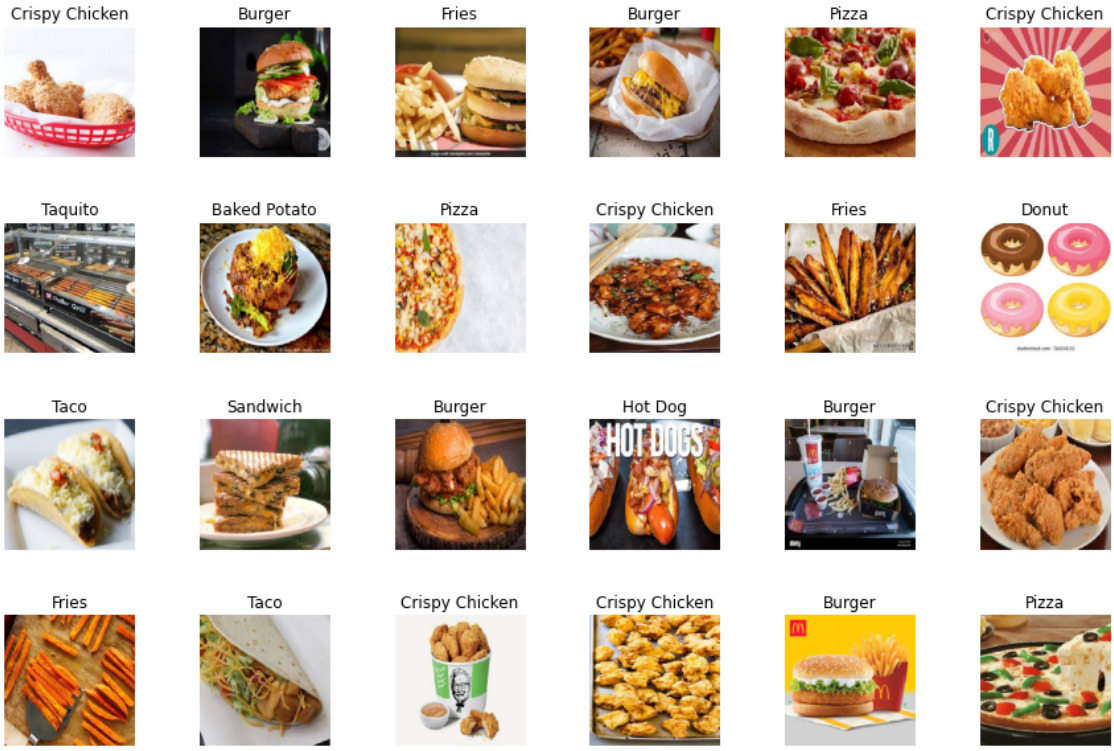
```
class_labels= ['Baked Potato', 'Burger', 'Crispy Chicken', 'Donut', 'Fries', 'Hot Dog', 'Pizza', 'Sandwich', 'Taco', 'Taquito']
```

In [7]:

```
batch = next(tr_gen)
images, labels = batch[0], batch[1]
```

In [8]:

```
class_labels= ['Baked Potato', 'Burger', 'Crispy Chicken', 'Donut', 'Fries', 'Hot Dog', 'Pizza', 'Sandwich', 'Taco', 'Taquito']
batch = next(tr_gen)
images, labels = batch[0], batch[1]

plt.figure(figsize=(15, 10))
for i in range(24):
    plt.subplot(4, 6, i + 1)
    plt.imshow(images[i])
    plt.axis('off')
    plt.title(class_labels[np.argmax(labels, axis = 1)[i]])
plt.subplots_adjust(wspace=0.5, hspace=0.5)
plt.show()
```

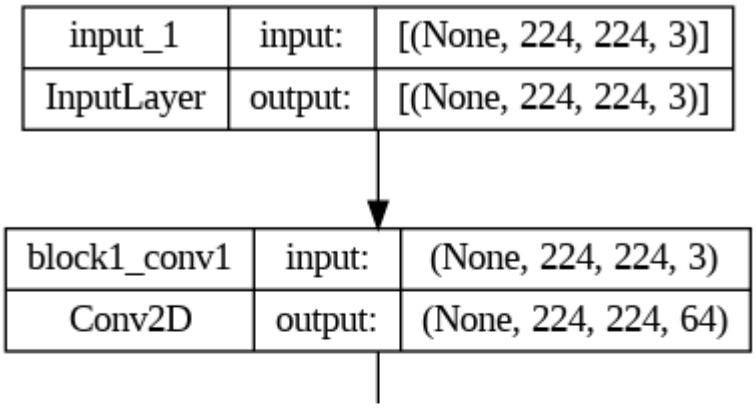


In [9]:

```
from tensorflow.keras.applications import VGG16

pre_trained_base = VGG16(include_top = False,
                         weights="imagenet",
                         input_shape = [224, 224, 3])

pre_trained_base.trainable = False

plot_model(pre_trained_base, show_shapes = True, show_layer_names= True, to_file
= 'vgg16.png')
```

```
Downloading data from https://storage.googleapis.com/tensorflow/keras-applic
ations/vgg16/vgg16_weights_tf_dim_ordering_tf_kernels_notop.h5 (https://stor
age.googleapis.com/tensorflow/keras-applications/vgg16/vgg16_weights_tf_dim_
ordering_tf_kernels_notop.h5)
58889256/58889256 [==============================] - 3s 0us/step
```

Out[9]:



In [20]:

```
class vgg_bulid(Model):
    def __init__(self, pre_trained_base):
        super (vgg_bulid, self).__init__()
        self.pre_vgg16 = pre_trained_base
        self.flatten = tf.keras.layers.Flatten()
        self.fc1 = Sequential([
            tf.keras.layers.Dense(256,
                  kernel_initializer = 'he_uniform'),
            tf.keras.layers.LeakyReLU(alpha = 0.1),
            tf.keras.layers.Dropout(0.5)
        ])
        self.fc2 = Sequential([
            tf.keras.layers.Dense(256,
                  kernel_initializer = 'he_uniform'),
            tf.keras.layers.LeakyReLU(alpha = 0.2),
            tf.keras.layers.Dropout(0.5)
        ])
        self.soft_max = tf.keras.layers.Dense(10, activation = 'softmax')

    def call(self, x):
        ret = self.pre_vgg16(x)
        ret = self.flatten(ret)
        ret = self.fc1(ret)
        ret = self.fc2(ret)
        return self.soft_max(ret)
```

In [21]:

```
vgg_model = vgg_bulid(pre_trained_base)
vgg_model(tf.keras.Input(shape = (224, 224, 3)))
```

Out[21]:

```
<KerasTensor: shape=(None, 10) dtype=float32 (created by layer 'vgg_bulid_1')>
```

In [22]:

```
vgg_model.compile(optimizer = tf.keras.optimizers.Adam(learning_rate=0.001,
beta_1=0.9, beta_2=0.999,),
                  loss = 'categorical_crossentropy',
                   metrics = ['acc'])
```

In [23]:

```
import datetime as dt

earlystopping = tf.keras.callbacks.EarlyStopping(monitor = 'val_loss', patience =
3)


checkpoint = tf.keras.callbacks.ModelCheckpoint(filepath =
f'/content/drive/MyDrive/4조/Team
Project/sojung/vgg_{dt.datetime.now().ctime()}.ckp',
                                                save_weights_only = True,
                                                save_best_only = True,
                                                monitor = 'val_loss',
                                                verbose = 1)
```

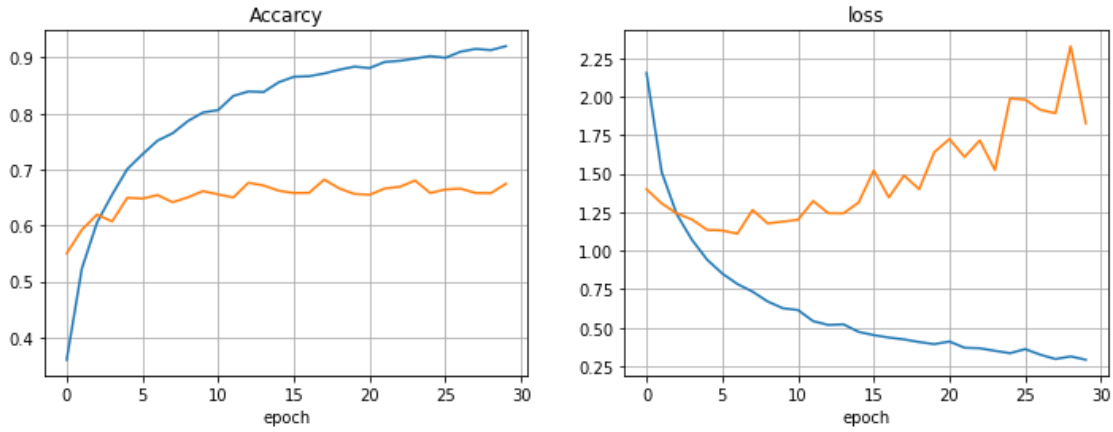
In [24]:

```
vgg_his = vgg_model.fit(tr_gen,
                        validation_data = val_gen,
                        epochs = 30,
                        callbacks = [checkpoint])
```

```
cc: 0.8665 - val_loss: 1.3452 - val_acc: 0.6583
Epoch 18/30
469/469 [==============================] - ETA: 0s - loss: 0.4233 - acc: 0.8
715
Epoch 18: val_loss did not improve from 1.10976
469/469 [==============================] - 100s 213ms/step - loss: 0.4233 -
acc: 0.8715 - val_loss: 1.4876 - val_acc: 0.6820
Epoch 19/30
469/469 [==============================] - ETA: 0s - loss: 0.4063 - acc: 0.8
782
Epoch 19: val_loss did not improve from 1.10976
469/469 [==============================] - 97s 206ms/step - loss: 0.4063 - a
cc: 0.8782 - val_loss: 1.3988 - val_acc: 0.6660
Epoch 20/30
469/469 [==============================] - ETA: 0s - loss: 0.3927 - acc: 0.8
837
Epoch 20: val_loss did not improve from 1.10976
469/469 [==============================] - 97s 206ms/step - loss: 0.3927 - a
cc: 0.8837 - val_loss: 1.6391 - val_acc: 0.6563
```

In [28]:

```
plot_loss_acc(vgg_his)
```



In [29]:

```
vgg_model.evaluate(te_gen)
```

```
47/47 [==============================] - 11s 244ms/step - loss: 1.5956 - acc: 0.
7013
```

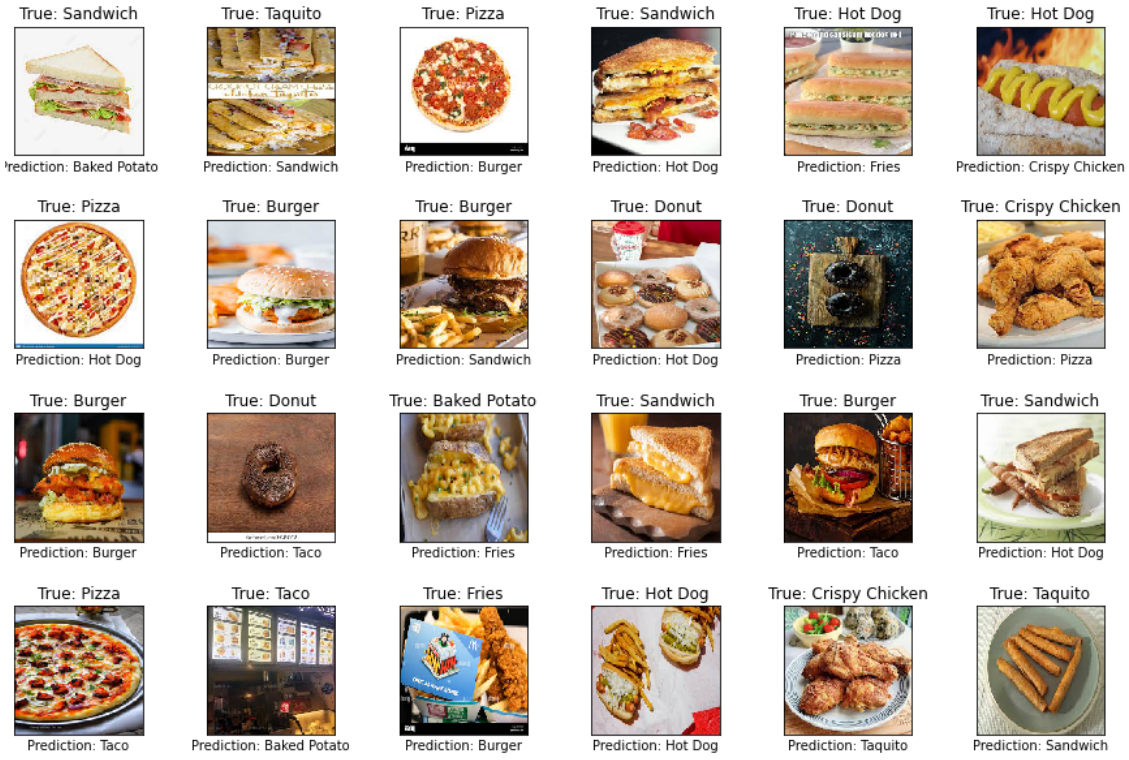
Out[29]:

```
[1.5955734252929688, 0.7013333439826965]
```

In [30]:

```
y_pred = np.argmax(vgg_model.predict(te_gen), axis = -1)

batch = next(tr_gen)
images, labels = batch[0], batch[1]

plt.figure(figsize=(15, 10))
for i in range(24):
    plt.subplot(4, 6, i + 1)
    plt.imshow(images[i], interpolation = 'nearest')
#     plt.axis('off')
    plt.xticks([])
    plt.yticks([])
    plt.xlabel(f'Prediction: {class_labels[y_pred[i]]}')
    plt.title('True: ' + class_labels[np.argmax(labels, axis = 1)[i]])
plt.subplots_adjust(wspace=0.5, hspace=0.5)
plt.show()
```

```
47/47 [==============================] - 9s 184ms/step
```



In [ ]:

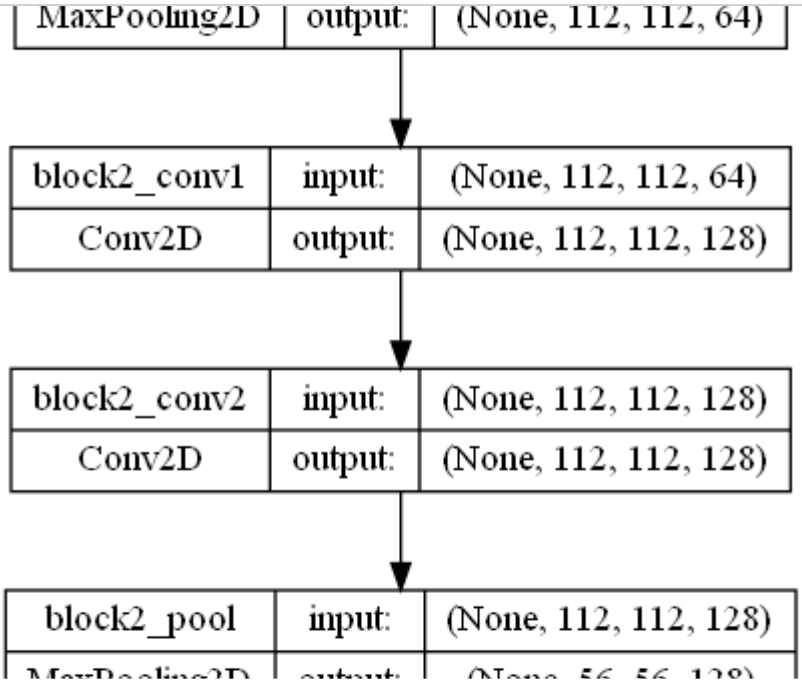
In [ ]:

```
```

가중치를 imagenet이 아닌 내가 학습시킴

In [14]:

```
from tensorflow.keras.applications import VGG16

pre_trained_base = VGG16(include_top = False,
                         weights="imagenet",
                         input_shape = [224, 224, 3])

pre_trained_base.trainable = False

plot_model(pre_trained_base, show_shapes = True, show_layer_names= True, to_file
= 'vgg16.png')
```



In [15]:

```
class vgg_bulid(Model):
    def __init__(self, pre_trained_base):
        super (vgg_bulid, self).__init__()
        self.pre_vgg16 = pre_trained_base
        self.flatten = tf.keras.layers.Flatten()
        self.fc1 = Sequential([
            tf.keras.layers.Dense(256,
                  kernel_initializer = 'he_uniform'),
            tf.keras.layers.LeakyReLU(alpha = 0.1),
            tf.keras.layers.BatchNormalization(),
            tf.keras.layers.Dropout(0.5)
        ])
        self.fc2 = Sequential([
            tf.keras.layers.Dense(256,
                  kernel_initializer = 'he_uniform'),

            tf.keras.layers.LeakyReLU(alpha = 0.2),
            tf.keras.layers.BatchNormalization(),
            tf.keras.layers.Dropout(0.5)
        ])
        self.soft_max = tf.keras.layers.Dense(10, activation = 'softmax')

    def call(self, x):
        ret = self.pre_vgg16(x)
        ret = self.flatten(ret)
        ret = self.fc1(ret)
        ret = self.fc2(ret)
        return self.soft_max(ret)
```

In [16]:

```
vgg_model2 = vgg_bulid(vgg16_not_weight)
vgg_model2(tf.keras.Input(shape = (224, 224, 3)))
vgg_model2.summary()
```

```
Model: "vgg_bulid_2"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 vgg16 (Functional)          (None, 7, 7, 512)         14714688

 flatten_2 (Flatten)         multiple                  0

 sequential_4 (Sequential)   (None, 256)               6423808

 sequential_5 (Sequential)   (None, 256)               66816

 dense_8 (Dense)             multiple                  2570

=================================================================
Total params: 21,207,882
Trainable params: 21,206,858
Non-trainable params: 1,024
_________________________________________________________________
```

In [20]:

```
import datetime as dt

earlystopping = tf.keras.callbacks.EarlyStopping(monitor = 'val_loss', patience =
3)


checkpoint = tf.keras.callbacks.ModelCheckpoint(filepath =
f'./saving/vgg_{dt.datetime.now().ctime()}.ckp',
                                                save_weights_only = True,
                                                save_best_only = True,
                                                monitor = 'val_loss',
                                                verbose = 1)
```

In [21]:

```
vgg_model2.compile(optimizer = 'adam',
                   loss = 'categorical_crossentropy',
                    metrics = ['acc'])
```

In [*]:

```
vgg_his2 = vgg_model2.fit(tr_gen,
                          validation_data = val_gen,
                          epochs = 30,
                          callbacks = [checkpoint])
```

```
Epoch 1/30
240/469 [==============>..............] - ETA: 1:33:18 - loss: 2.9124 - acc: 0.
1409
```

In [ ]:

```
plot_loss_acc(vgg_his2)
```

In [ ]:

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