Classifying Edible vs Poisonous Mushroom

Using Fast.ai to build edible vs Poisonous Mushroom.

```
!pip install fastbook fastai fastdownload
```

Show hidden output

Import packages

```
from fastbook import *
from fastai.vision.widgets import *
from fastdownload import *
from pathlib import Path
from PIL import Image
```

Define category & download images to dest

```
searches = 'poisonous', 'edible'
path = Path('mushroom')

# add this if rerun or presumably path has already been created
if not path.exists():
    path.mkdir(exist_ok=True)

for o in searches:
    dest = (path/o)
    dest.mkdir(exist_ok=True)
    results = search_images_ddg(f'{o} mushroom')
    #urls = results.attrgot('contentUrl') - for first run
    #this is for rerun if you run all after the first time
    urls=results
    # Filter out None values
    urls = [url for url in urls if url is not None]
    download_images(dest, urls=urls)
    print(f'Downloaded images for {o} mushroom')
```

```
Downloaded images for poisonous mushroom
Downloaded images for edible mushroom
```

Verify & Drop Failed Images

```
# get the images
imp = get_image_files(path)
```

```
#verify if any images in the file
if imp:
    print("Yeap, images are well stored")
else:
    print("No images found in directory")
```

```
Yeap, images are well stored
```

```
# check failed images
failed = verify_images(imp)
print("Total failed images:",len(failed))
```

```
Total failed images: 6
```

```
# drop images
failed.map(Path.unlink)
```

```
(#6) [None,None,None,None,None,None]
```

```
len(imp)
```

```
350
```

Preprocessing using Data Block & Split (T&V) using Data Loaders

Note to self: Defines a DataBlock to specify data loading and preprocessing steps.

- ImageBlock: Input is an image.
- CategoryBlock: Output is a category (bear type).
- get_items: Function to retrieve image files.
- splitter: Splits data into training and validation sets.
- get_y: Function to extract labels from file paths.
- item_tfms: Transformations applied to individual images (resizing)

Creates dataloaders for training and validation.

```
#create Datablock
mushrooms = DataBlock(
    blocks=(ImageBlock, CategoryBlock),
    get_items=get_image_files,
    splitter=RandomSplitter(valid_pct=0.2, seed=57),
    get_y=parent_label,
    item_tfms=[Resize(192, method='squish')]
)
```

```
#create DataLoaders

dls = mushrooms.dataloaders(path)
```

```
# view validation sets
dls.valid.show_batch(max_n =4, nrows=1)
```

Model Training

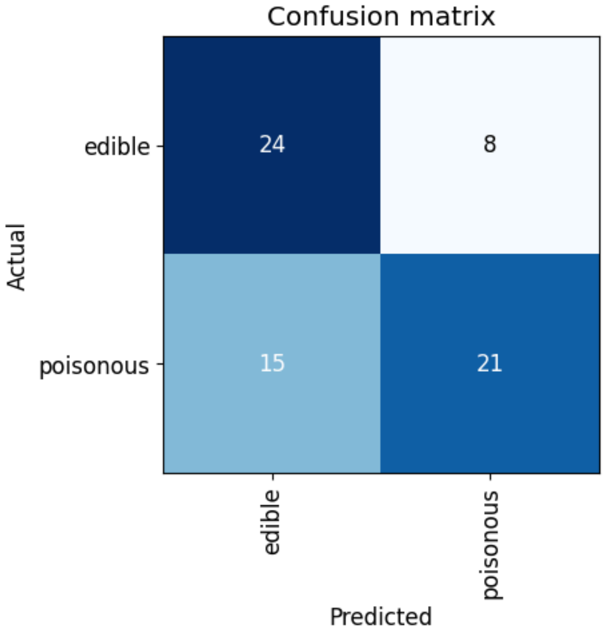
```
learn = vision_learner(dls, resnet18, metrics=error_rate)
learn.fine_tune(4)
```

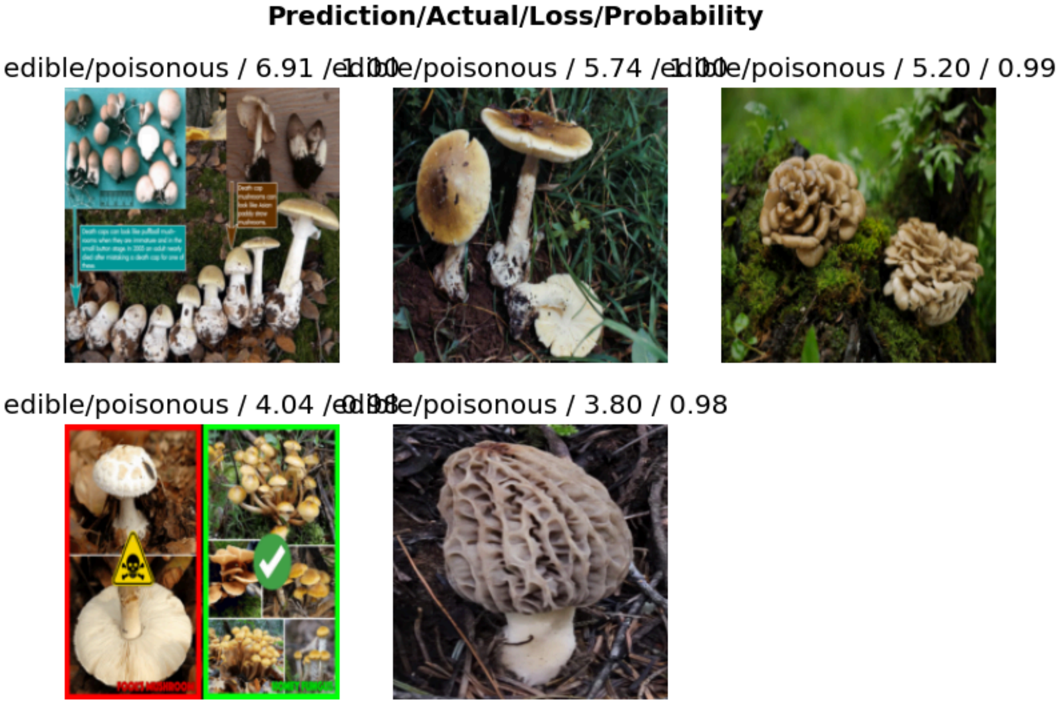
epoch	train_loss	valid_loss	error_rate	time
0	1.244349	0.902226	0.338235	00:31

epoch	train_loss	valid_loss	error_rate	time
0	0.789035	0.605166	0.294118	00:40
1	0.661567	0.783579	0.323529	00:40
2	0.541666	0.890078	0.338235	00:41
3	0.452383	0.904957	0.338235	00:41

Model Evaluation

```
interp = ClassificationInterpretation.from_learner(learn)
interp.plot_confusion_matrix()
interp.plot_top_losses(k=5, nrows=2)
```

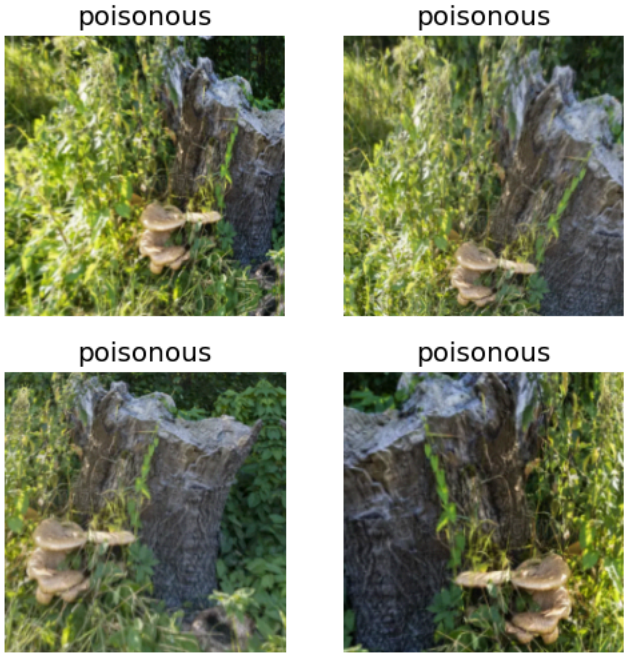

Confusion matrix
Actual
edible
poisonous
24
8
15
21
Predicted
edible
poisonous


Prediction/Actual/Loss/Probability
edible/poisonous / 6.91 / 1.00
edible/poisonous / 5.74 / 1.00
edible/poisonous / 5.20 / 0.99
edible/poisonous / 4.04 / 0.98
edible/poisonous / 3.80 / 0.98

Using Data Augmentation to transform Data and retrain new model

Owing to confusion matrix are rather high in validation set, we are using aug_transforms to improve accuracy

```
aug_mush =  mushrooms.new(item_tfms=RandomResizedCrop(224, min_scale=0.5), batch_tfms=aug_transforms())
dls = aug_mush.dataloaders(path)
dls.train.show_batch(max_n=4, unique=True)
```



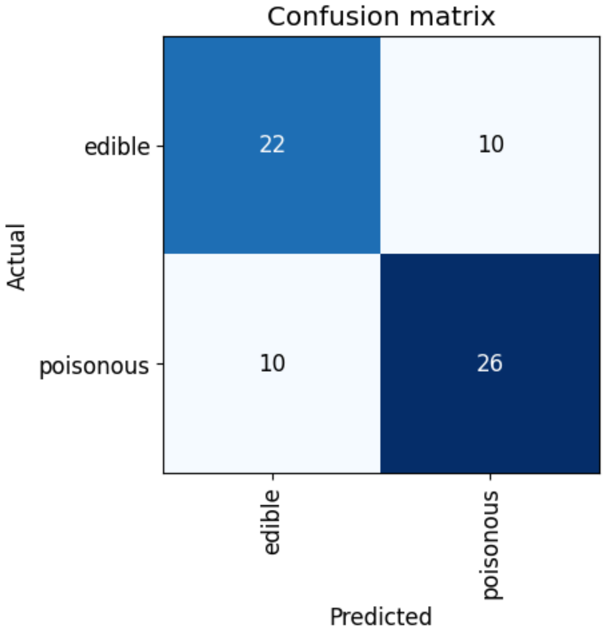
poisonous poisonous

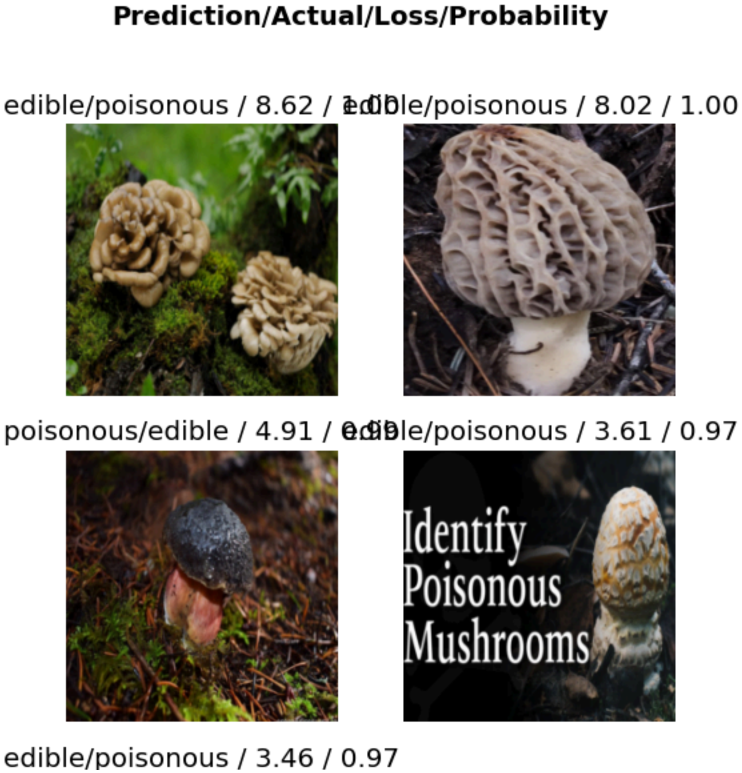
poisonous poisonous

```
learn2 = vision_learner(dls, resnet18, metrics=error_rate)
learn2.fine_tune(4)
```

```
epoch  train_loss  valid_loss  error_rate  time
    0    1.263114    1.066702    0.382353  00:40
epoch  train_loss  valid_loss  error_rate  time
    0    0.826939    0.871579    0.367647  00:53
    1    0.760323    0.878581    0.323529  00:53
    2    0.678567    0.928370    0.294118  00:54
    3    0.618683    0.939456    0.294118  00:53
```

```
interp = ClassificationInterpretation.from_learner(learn2)
interp.plot_confusion_matrix()
interp.plot_top_losses(k=5, nrows=3)
```


Confusion matrix
Actual
edible
poisonous
22
10
10
26
edible
poisonous
Predicted


Prediction/Actual/Loss/Probability
edible/poisonous / 8.62 / 1.00
edible/poisonous / 8.02 / 1.00
poisonous/edible / 4.91 / 0.99
edible/poisonous / 3.61 / 0.97
Identify Poisonous Mushrooms
edible/poisonous / 3.46 / 0.97

```
#i am not going to alter this, as i am not mushroom expect, however note to self
cleaner = ImageClassifierCleaner(learn2)
cleaner
```

```
VBox(children=(Dropdown(options=('edible', 'poisonous'), value='edible'), Dropdown(options=('Train', 'Valid'),…
```

Export Model

```
learn2.export()
```

```
path = Path()
path.ls(file_exts = '.pkl')
```

```
(#1) [Path('export.pkl')]
```

```
learn2_inf = load_learner(path/'export.pkl')
```

```
#predict mushroom images
ps_mush = download_url('https://blog.uvahealth.com/wp-content/uploads/2017/02/poisonousmushrooms.slideshow.jpg')
learn2_inf.predict(ps_mush)
```

```
                                        100.50% [270336/268994 00:00<00:00]
('poisonous', tensor(1), tensor([0.0793, 0.9207]))
```

```
#as shown above classifier has identify this image as poisonous, let's see how this mushroom looks like
Image.open(ps_mush)
```