In [1]:

```
# This Python 3 environment comes with many helpful analytics libraries installed
# It is defined by the kaggle/python Docker image: https://github.com/kaggle/docker-pytho
n
# For example, here's several helpful packages to load

import numpy as np # linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)

# Input data files are available in the read-only "../input/" directory
# For example, running this (by clicking run or pressing Shift+Enter) will list all files
under the input directory

import os
for dirname, _, filenames in os.walk('/kaggle/input'):
    for filename in filenames:
        os.path.join(dirname, filename)

# You can write up to 20GB to the current directory (/kaggle/working/) that gets preserve
d as output when you create a version using "Save & Run All"
# You can also write temporary files to /kaggle/temp/, but they won't be saved outside of
the current session
```

In [2]:

```
import fastai
import pandas as pd
from fastai import *
from fastai.vision import *
from fastai.vision.all import *
from fastai.data.all import *
```

In [3]:

```
csv_path = "/kaggle/input/skin-cancer-mnist-ham10000/HAM10000_metadata.csv"
df = pd.read_csv(csv_path)
df.sort_values(by="image_id")
```

Out[3]:

	lesion_id	image_id	dx	dx_type	age	sex	localization
4349	HAM_0000550	ISIC_0024306	nv	follow_up	45.0	male	trunk
4263	HAM_0003577	ISIC_0024307	nv	follow_up	50.0	male	lower extremity
4217	HAM_0001477	ISIC_0024308	nv	follow_up	55.0	female	trunk
3587	HAM_0000484	ISIC_0024309	nv	follow_up	40.0	male	trunk
1451	HAM_0003350	ISIC_0024310	mel	histo	60.0	male	chest
...	...	...	...	...	...	...	...
1721	HAM_0004304	ISIC_0034316	mel	histo	85.0	male	upper extremity
1888	HAM_0006376	ISIC_0034317	mel	histo	70.0	female	lower extremity
121	HAM_0000344	ISIC_0034318	bkl	histo	55.0	male	trunk
7440	HAM_0000747	ISIC_0034319	nv	histo	30.0	male	trunk
7363	HAM_0002244	ISIC_0034320	nv	histo	25.0	female	chest

10015 rows × 7 columns

In [4]:

```
short_to_full_name_dict = {
    "akiec" : "Bowen's disease",
    "bcc" : "basal cell carcinoma" ,
    "bkl" : "benign keratosis-like lesions",
    "df" : "dermatofibroma",
    "mel" : "melanoma",
    "nv" : "melanocytic nevi",
    "vasc" : "vascular lesions",
}
```

In [5]:

```
img_to_class_dict = df.loc[:, ["image_id", "dx"]]
img_to_class_dict = img_to_class_dict.to_dict('list')
img_to_class_dict = {img_id : short_to_full_name_dict[disease] for img_id,disease in zip
(img_to_class_dict['image_id'], img_to_class_dict['dx']) }
[x for x in img_to_class_dict.items()][:5]
```

Out[5]:

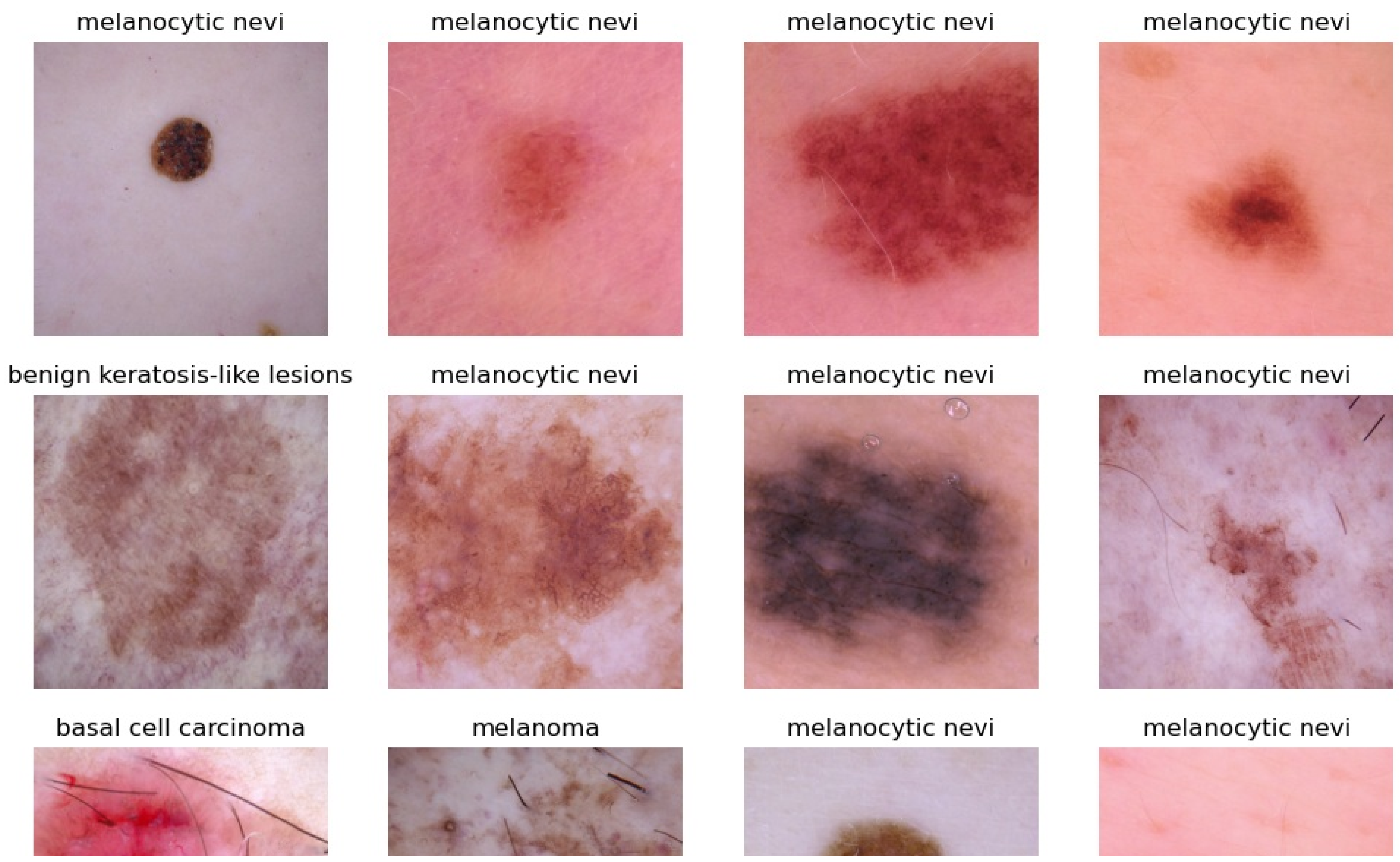
```
[('ISIC_0027419', 'benign keratosis-like lesions'),
 ('ISIC_0025030', 'benign keratosis-like lesions'),
 ('ISIC_0026769', 'benign keratosis-like lesions'),
 ('ISIC_0025661', 'benign keratosis-like lesions'),
 ('ISIC_0031633', 'benign keratosis-like lesions')]
```

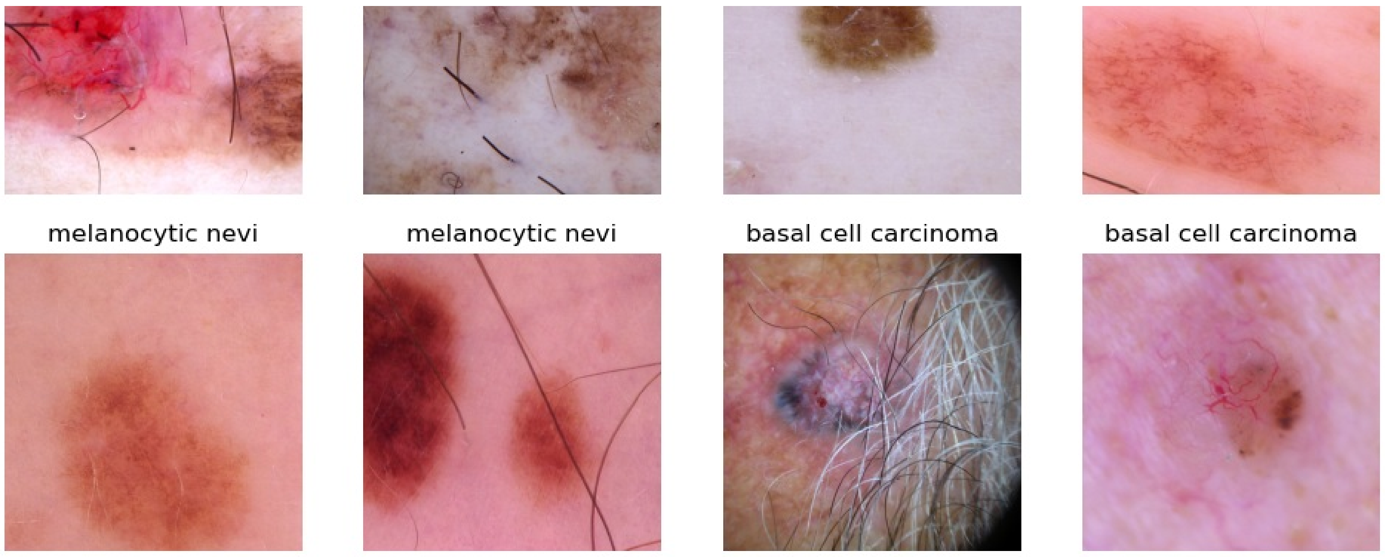
In [6]:

```
def get_label_from_dict(path):
    return img_to_class_dict[path.stem]

skin_db = DataBlock(
    blocks=(ImageBlock, CategoryBlock),
    item_tfms=[Resize(450), DihedralItem()],
    batch_tfms=RandomResizedCrop(size=224, min_scale=0.75, max_scale=1.0),
    get_items=get_image_files,
    splitter=RandomSplitter(valid_pct=0.3, seed=42),
    get_y=get_label_from_dict,
)

img_path = "/kaggle/input/skin-cancer-mnist-ham10000"
dls = skin_db.dataloaders(img_path)
```

In [7]:

```
dls.show_batch(max_n=16, nrows=4)
```





In [8]:

```
!pip install GPUtil
```

```
Collecting GPUtil
  Downloading GPUtil-1.4.0.tar.gz (5.5 kB)
  Preparing metadata (setup.py) ... done
Building wheels for collected packages: GPUtil
  Building wheel for GPUtil (setup.py) ... done
  Created wheel for GPUtil: filename=GPUtil-1.4.0-py3-none-any.whl size=7409 sha256=db852
1e9cb6391b5a44835bc55911fe3da4f8e1f8d7e1c7d85c4157b7ba1ecd4
  Stored in directory: /root/.cache/pip/wheels/b1/e7/99/2b32600270cf23194c9860f029d3d5db0
75f250bc39028c045
Successfully built GPUtil
Installing collected packages: GPUtil
Successfully installed GPUtil-1.4.0
WARNING: Running pip as the 'root' user can result in broken permissions and conflicting
behaviour with the system package manager. It is recommended to use a virtual environment
instead: https://pip.pypa.io/warnings/venv
```

In [9]:

```
from GPUtil import showUtilization as gpu_usage
gpu_usage()

import torch
torch.cuda.empty_cache()
```

```
| ID | GPU | MEM |
------------------
|  0 |  0% |  9% |
```

In [10]:

```
learn = cnn_learner(dls, resnet18, metrics=accuracy, opt_func=ranger)
learn.fine_tune(epochs=30, freeze_epochs=3, base_lr=0.005, cbs=MixUp(0.5))
```

```
/opt/conda/lib/python3.7/site-packages/fastai/vision/learner.py:288: UserWarning: `cnn_le
arner` has been renamed to `vision_learner` -- please update your code
  warn("`cnn_learner` has been renamed to `vision_learner` -- please update your code")
/opt/conda/lib/python3.7/site-packages/torchvision/models/_utils.py:209: UserWarning: The
parameter 'pretrained' is deprecated since 0.13 and may be removed in the future, please
use 'weights' instead.
  f"The parameter '{pretrained_param}' is deprecated since 0.13 and may be removed in the
future, "
/opt/conda/lib/python3.7/site-packages/torchvision/models/_utils.py:223: UserWarning: Arg
uments other than a weight enum or `None` for 'weights' are deprecated since 0.13 and may
be removed in the future. The current behavior is equivalent to passing `weights=ResNet18
_Weights.IMAGENET1K_V1`. You can also use `weights=ResNet18_Weights.DEFAULT` to get the m
ost up-to-date weights.
  warnings.warn(msg)
Downloading: "https://download.pytorch.org/models/resnet18-f37072fd.pth" to /root/.cache/
torch/hub/checkpoints/resnet18-f37072fd.pth
```

epoch	train_loss	valid_loss	accuracy	time
0	2.043256	1.086300	0.691130	06:50
1	1.104947	0.624305	0.775503	04:13
2	0.885769	0.573451	0.796472	04:13

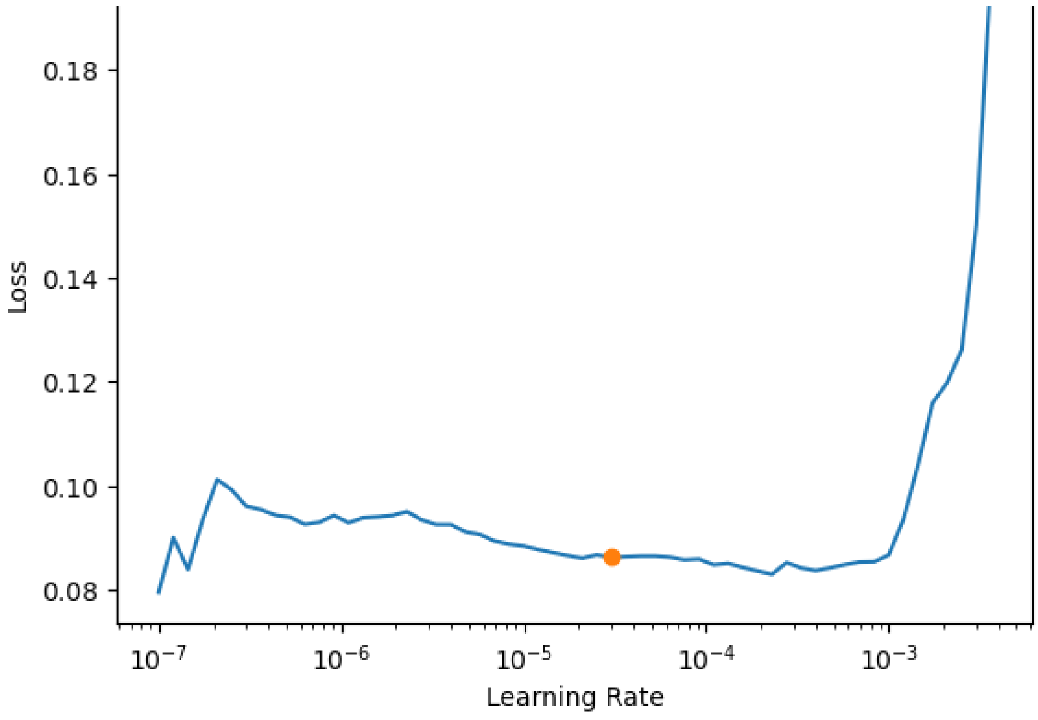
epoch	train_loss	valid_loss	accuracy	time
0	0.755308	0.468768	0.834249	04:26
1	0.707593	0.411693	0.858712	04:27
2	0.672564	0.375797	0.870528	04:27
3	0.650821	0.344235	0.889665	04:28
4	0.634279	0.345014	0.883342	05:43
5	0.601421	0.321498	0.891829	05:38
6	0.596203	0.397159	0.857880	04:40
7	0.585376	0.269682	0.914961	06:47
8	0.571816	0.366504	0.875021	06:23
9	0.552480	0.259081	0.913796	04:51
10	0.539393	0.275110	0.907805	04:28
11	0.522806	0.245165	0.914961	04:29
12	0.502613	0.199589	0.938426	04:29
13	0.487073	0.204677	0.935264	04:26
14	0.487707	0.238969	0.919288	04:27
15	0.453201	0.165753	0.950574	04:27
16	0.456821	0.166004	0.955899	04:26
17	0.443454	0.142854	0.964054	04:28
18	0.434803	0.138586	0.965385	04:23
19	0.407063	0.127556	0.966717	04:16
20	0.422691	0.122868	0.970544	04:17
21	0.416465	0.118928	0.971709	04:17
22	0.413294	0.119454	0.973207	04:17
23	0.401228	0.111835	0.971876	04:19
24	0.397174	0.107922	0.972708	04:19
25	0.389953	0.107366	0.975370	04:18
26	0.382036	0.104543	0.976868	04:17
27	0.395707	0.105295	0.976535	04:18
28	0.399156	0.102488	0.976202	04:18
29	0.385271	0.102930	0.976702	04:19

In [11]:

```
learn.lr_find()
```

Out[11]:

```
SuggestedLRs(valley=3.0199516913853586e-05)
```



```
In [ ]:
```