From Bytes to Bites: Teaching a Machine to Differentiate Hotdogs from Vegrolls

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Introduction:

Imagine you're at a bustling street fair, the air rich with the scents of various foods. At one stall, a vendor sells hotdogs; at another, vegrolls. Both are wrapped and look similar from a distance. It's a culinary conundrum many have faced: how do you pick your preferred snack quickly? Here's where artificial intelligence steps in, turning what seems like a trivial choice into an opportunity for innovation.

In this blog post, we'll explore how a neural network can be trained to tell a hotdog from a vegroll with surprising accuracy, using the fastai library. This journey will take us from raw pixels to a refined AI model that understands food better than some of us might!

The Appetizer — What is Image Classification?

Image classification is the process where a computer algorithm assigns a label to an image from a set of predefined categories. This is similar to how your brain categorizes visuals: you see an object, your neurons fire up, and you recognize it as, say, a hotdog or a vegroll. Machines can now mimic this, thanks to leaps in machine learning.

Preparing the Ingredients — Data Collection and Preparation

Our recipe for AI begins with the key ingredient: data. We collected images of hotdogs and vegrolls and prepared them for our model. This preparation involved ensuring our dataset was balanced and that the images were of good quality. In machine learning, quality data is like fresh produce; it can make or break your final dish.

Data Preparation

```
[ ]
search_terms = ['Vegroll', 'hotdog']
path = Path('food')

# Check if the directory exists
if path.exists():
    shutil.rmtree(path)

# Create directories and download images for each search term
for o in search_terms:
    dest = (path/o)
    dest.mkdir(exist_ok=True, parents=True)
    results = search_images_ddg(f'{o} food', max_images=50)
    download_images(dest, urls=results)
```

```
[ ] ### delete data if the file is not opening

for o in search_terms:
    verify_images(path/o)
    for img in (path/o).ls():
        try:
            # Open image to verify it's not corrupted
            img = PILImage.create(img)
        except Exception as e:
            # If an error occurs during opening, the image file is likely corrupted, so remove it
            img.unlink()
```

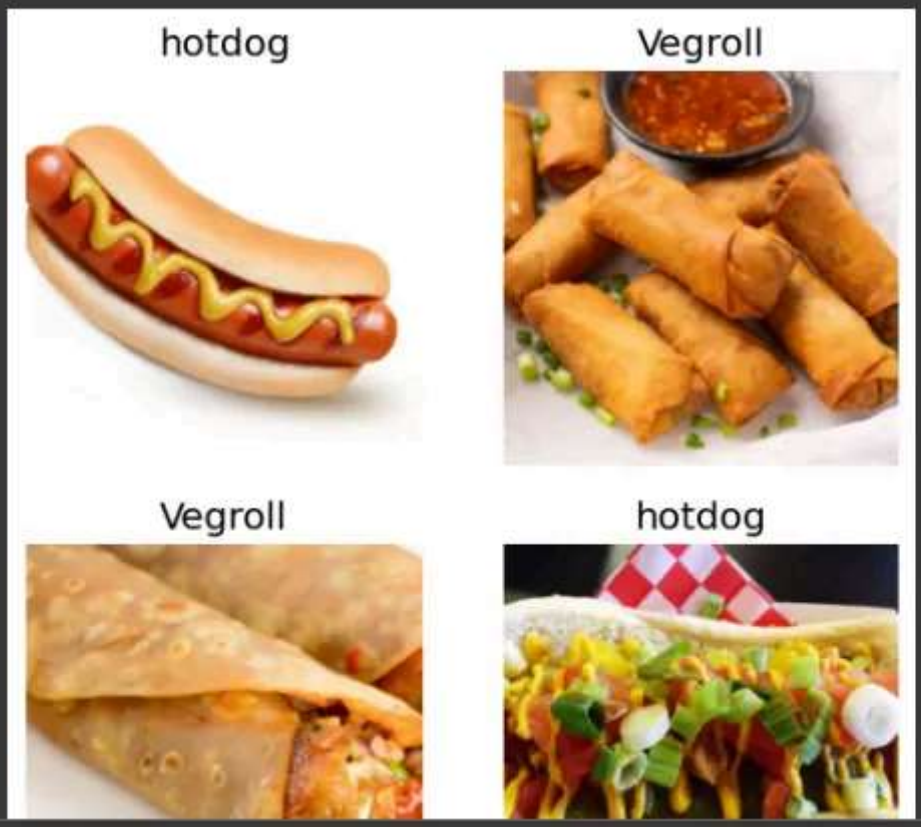
```
'WindowsPath' object is not iterable
'WindowsPath' object is not iterable
```

```
# Define the path to your images
path = Path('food')

# Create a DataBlock
datablock = DataBlock(
    blocks=(ImageBlock, CategoryBlock),
    get_items=get_image_files,
    splitter=RandomSplitter(valid_pct=0.2, seed=42),
    get_y=parent_label,
    item_tfms=Resize(224)
)

# Create a DataLoaders object
dls = datablock.dataloaders(path, bs=32)

# Show a batch to verify everything is loaded correctly
dls.show_batch(max_n=4)
```



Stirring the Pot — Building the Model

With our ingredients prepped, it was time to cook up our model. Using the fastai library, a user-friendly yet powerful tool for deep learning, we began

crafting our algorithm. We fed it images, teaching it the visual nuances that differentiate a hotdog from a vegroll.

Taste Testing — Training the Model

Training a machine learning model is like seasoning a dish; it requires balance. Too little training, and the model can't make accurate predictions; too much, and it might only work with the data it has seen, failing with new images. We found our 'seasoning' by adjusting the learning rate, the step at which the model learns from the data.

The Main Course — Model Evaluation

The proof, they say, is in the pudding — or, in our case, the prediction. We evaluated our model's accuracy by having it predict unseen images, checking whether it identified them as hotdogs or vegrolls. A confusion matrix — a table used to describe the performance of a classification model — gave us a clear view of where the model excelled and where it needed more training.

Serving the Dish — Deploying the Model

Once trained and tested, we deployed our model into the real world. We used an interface where users could upload an image of their meal, and our AI would tell them whether it was a hotdog or a vegroll. This step is like opening a restaurant after perfecting your signature dish.

Conclusion:

Our journey from data collection to model deployment is a testament to the power of machine learning. We've seen how a seemingly simple task, like

differentiating between two food items, can be a window into the potential of AI.

References:

- fastai: A layered API for deep learning
- Github Code

Fastai | Image Classification | Data Science

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