

```
# DeBERTa-v3-small Notebook
# 1. Install and import dependencies
!pip install transformers datasets
import pandas as pd, numpy as np, torch, random, re
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import LabelEncoder
from sklearn.metrics import accuracy_score, f1_score
from transformers import AutoTokenizer, AutoModelForSequenceClassification, get_scheduler
from torch.utils.data import DataLoader, Dataset
from transformers import DataCollatorWithPadding
from torch.optim import AdamW
from torch.optim.swa_utils import AveragedModel, SWALR
from tqdm import tqdm
import nltk
from nltk.corpus import wordnet
nltk.download('wordnet')

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[nltk_data] Downloading package wordnet to /root/nltk_data...
[nltk_data]   Package wordnet is already up-to-date!
True
```

```
device = torch.device("cuda" if torch.cuda.is_available() else "cpu")
```

```
# 2. Load dataset
train_df = pd.read_csv('/content/Constraint_Train.csv')
val_df = pd.read_csv('/content/Constraint_Val.csv')
```

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# 3. Label encode
le = LabelEncoder()
train_df['label_encoded'] = le.fit_transform(train_df['label'])
val_df['label_encoded'] = le.transform(val_df['label'])

# 4. Synonym Replacement Augmentation
def synonym_replacement(text, n=1):
    words = re.findall(r'\w+', text)
    new_words = words.copy()
    random.shuffle(words)
    for word in words:
        synonyms = wordnet.synsets(word)
        if synonyms:
            synonym_list = list(set([s.lemma.name().replace('_', ' ') for s in synonyms for lemma in s.lemmas]))
            if synonym_list:
                new_words = [random.choice(synonym_list) if w == word else w for w in new_words]
                break
    return ' '.join(new_words)

augmented_texts, augmented_labels = [], []

for i in range(len(train_df)):
    if random.random() < 0.3:
        augmented_texts.append(synonym_replacement(train_df.iloc[i]['tweet']))
        augmented_labels.append(train_df.iloc[i]['label_encoded'])

aug_df = pd.DataFrame({'tweet': augmented_texts, 'label_encoded': augmented_labels})
train_df = pd.concat([train_df[['tweet', 'label_encoded']], aug_df], ignore_index=True)

```

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# 5. Dataset
class NewsDataset(Dataset):
    def __init__(self, texts, labels, tokenizer):
        self.encodings = tokenizer(texts, truncation=True, padding=True, max_length=128)
        self.labels = labels

    def __getitem__(self, idx):
        item = {key: torch.tensor(val[idx]) for key, val in self.encodings.items()}
        item['labels'] = torch.tensor(self.labels[idx])
        return item

    def __len__(self):
        return len(self.labels)

```

Start coding or generate with AI.

```

# 6. Tokenizer and Dataloaders
model_name = "microsoft/deberta-v3-small"
tokenizer = AutoTokenizer.from_pretrained(model_name)
data_collator = DataCollatorWithPadding(tokenizer=tokenizer)

train_dataset = NewsDataset(
    train_df['tweet'].tolist(),
    train_df['label_encoded'].tolist(),
    tokenizer
)

val_dataset = NewsDataset(
    val_df['tweet'].tolist(),

```

```
val_df['label_encoded'].tolist(),
tokenizer
)

train_dataloader = DataLoader(
    train_dataset,
    batch_size=16,
    shuffle=True,
    collate_fn=data_collator
)

val_dataloader = DataLoader(
    val_dataset,
    batch_size=16,
    collate_fn=data_collator
)
```

↳ /usr/local/lib/python3.11/dist-packages/huggingface\_hub/utils/\_auth.py:94: UserWarning:  
The secret `HF\_TOKEN` does not exist in your Colab secrets.  
To authenticate with the Hugging Face Hub, create a token in your settings tab (<https://huggingface.co>).  
You will be able to reuse this secret in all of your notebooks.  
Please note that authentication is recommended but still optional to access public models or data.  
warnings.warn(  
tokenizer\_config.json: 100% 52.0/52.0 [00:00<00:00, 1.31kB/s]  
config.json: 100% 578/578 [00:00<00:00, 28.1kB/s]  
spm.model: 100% 2.46M/2.46M [00:00<00:00, 15.4MB/s]

/usr/local/lib/python3.11/dist-packages/transformers/convert\_slow\_tokenizer.py:559: UserWarning  
warnings.warn(



## # 7. Model and Optimizer Setup

```
model = AutoModelForSequenceClassification.from_pretrained(model_name, num_labels=2).to(device)
```

```
lr = 2e-5
optimizer = AdamW(model.parameters(), lr=lr)
```

```
total_steps = len(train_dataloader) * 10
```

```
scheduler = get_scheduler(
    "linear",
    optimizer=optimizer,
    num_warmup_steps=0,
    num_training_steps=total_steps
)
```

```
swa_model = AveragedModel(model)
swa_scheduler = SWALR(optimizer, swa_lr=1e-5)
```

pytorch\_model.bin: 100%

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model.safetensors: 100%

286M/286M [00:02<00:00, 164MB/s]

Some weights of DebertaV2ForSequenceClassification were not initialized from the model checkpoint.  
You should probably TRAIN this model on a down-stream task to be able to use it for predictions.



## # 8. Training

```
best_acc = 0
```

```
for epoch in range(10):
```

```
model.train()
total_loss = 0

for batch in tqdm(train_dataloader, desc=f"Epoch {epoch+1}"):
    batch = {k: v.to(device) for k, v in batch.items()}
    outputs = model(**batch)
    loss = outputs.loss
    loss.backward()
    total_loss += loss.item()
    optimizer.step()
    scheduler.step()
    optimizer.zero_grad()

model.eval()
preds, labels = [], []

for batch in val_dataloader:
    batch = {k: v.to(device) for k, v in batch.items()}
    with torch.no_grad():
        out = model(**batch)
        preds += torch.argmax(out.logits, axis=1).cpu().tolist()
        labels += batch['labels'].cpu().tolist()

acc = accuracy_score(labels, preds)
print(f"Epoch {epoch+1} - Loss: {total_loss:.4f}, F1 SCORE: {acc:.4f}")

if acc > best_acc:
    best_acc = acc
    torch.save(model.state_dict(), "deberta_best.pt")

if epoch >= 6:
    swa_model.update_parameters(model)
    swa_scheduler.step()

print("Best DeBERTa Accuracy:", best_acc)
```



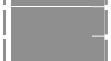
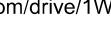
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Epoch 1: 31%	163/521 [00:39<01:22, 4.33it/s]
Epoch 1: 31%	164/521 [00:39<01:22, 4.34it/s]
Epoch 1: 32%	165/521 [00:39<01:22, 4.32it/s]
Epoch 1: 32%	166/521 [00:40<01:21, 4.34it/s]
Epoch 1: 32%	167/521 [00:40<01:21, 4.34it/s]
Epoch 1: 32%	168/521 [00:40<01:21, 4.33it/s]
Epoch 1: 32%	169/521 [00:40<01:21, 4.34it/s]
Epoch 1: 33%	170/521 [00:41<01:21, 4.33it/s]
Epoch 1: 33%	171/521 [00:41<01:20, 4.33it/s]
Epoch 1: 33%	172/521 [00:41<01:20, 4.33it/s]
Epoch 1: 33%	173/521 [00:41<01:20, 4.32it/s]
Epoch 1: 33%	174/521 [00:41<01:20, 4.32it/s]
Epoch 1: 34%	175/521 [00:42<01:20, 4.31it/s]
Epoch 1: 34%	176/521 [00:42<01:19, 4.33it/s]
Epoch 1: 34%	177/521 [00:42<01:19, 4.33it/s]
Epoch 1: 34%	178/521 [00:42<01:19, 4.32it/s]
Epoch 1: 34%	179/521 [00:43<01:18, 4.33it/s]
Epoch 1: 35%	180/521 [00:43<01:18, 4.33it/s]
Epoch 1: 35%	181/521 [00:43<01:18, 4.34it/s]
Epoch 1: 35%	182/521 [00:43<01:18, 4.34it/s]
Epoch 1: 35%	183/521 [00:44<01:18, 4.33it/s]
Epoch 1: 35%	184/521 [00:44<01:17, 4.35it/s]
Epoch 1: 36%	185/521 [00:44<01:17, 4.33it/s]
Epoch 1: 36%	186/521 [00:44<01:17, 4.33it/s]
Epoch 1: 36%	187/521 [00:44<01:17, 4.31it/s]
Epoch 1: 36%	188/521 [00:45<01:17, 4.30it/s]
Epoch 1: 36%	189/521 [00:45<01:17, 4.30it/s]
Epoch 1: 36%	190/521 [00:45<01:16, 4.31it/s]
Epoch 1: 37%	191/521 [00:45<01:16, 4.31it/s]
Epoch 1: 37%	192/521 [00:46<01:16, 4.31it/s]
Epoch 1: 37%	193/521 [00:46<01:16, 4.31it/s]
Epoch 1: 37%	194/521 [00:46<01:15, 4.32it/s]
Epoch 1: 37%	195/521 [00:46<01:15, 4.32it/s]
Epoch 1: 38%	196/521 [00:47<01:15, 4.31it/s]
Epoch 1: 38%	197/521 [00:47<01:15, 4.32it/s]
Epoch 1: 38%	198/521 [00:47<01:15, 4.29it/s]
Epoch 1: 38%	199/521 [00:47<01:14, 4.30it/s]
Epoch 1: 38%	200/521 [00:47<01:14, 4.28it/s]
Epoch 1: 39%	201/521 [00:48<01:14, 4.30it/s]
Epoch 1: 39%	202/521 [00:48<01:14, 4.31it/s]
Epoch 1: 39%	203/521 [00:48<01:13, 4.30it/s]
Epoch 1: 39%	204/521 [00:48<01:13, 4.30it/s]
Epoch 1: 39%	205/521 [00:49<01:13, 4.29it/s]
Epoch 1: 40%	206/521 [00:49<01:13, 4.29it/s]
Epoch 1: 100%	207/521 [00:49<01:13, 4.29it/s]

Epoch 1: 40%	207/521 [00:49<01:13, 4.29it/s]
Epoch 1: 40%	208/521 [00:49<01:13, 4.27it/s]
Epoch 1: 40%	209/521 [00:50<01:13, 4.27it/s]
Epoch 1: 40%	210/521 [00:50<01:12, 4.27it/s]
Epoch 1: 40%	211/521 [00:50<01:12, 4.30it/s]
Epoch 1: 41%	212/521 [00:50<01:09, 4.47it/s]
Epoch 1: 41%	213/521 [00:50<01:11, 4.30it/s]
Epoch 1: 41%	214/521 [00:51<01:11, 4.27it/s]
Epoch 1: 41%	215/521 [00:51<01:12, 4.23it/s]
Epoch 1: 41%	216/521 [00:51<01:11, 4.25it/s]
Epoch 1: 42%	217/521 [00:51<01:11, 4.25it/s]
Epoch 1: 42%	218/521 [00:52<01:11, 4.25it/s]
Epoch 1: 42%	219/521 [00:52<01:11, 4.24it/s]
Epoch 1: 42%	220/521 [00:52<01:10, 4.25it/s]
Epoch 1: 42%	221/521 [00:52<01:10, 4.26it/s]
Epoch 1: 43%	222/521 [00:53<01:10, 4.26it/s]
Epoch 1: 43%	223/521 [00:53<01:10, 4.25it/s]
Epoch 1: 43%	224/521 [00:53<01:09, 4.26it/s]
Epoch 1: 43%	225/521 [00:53<01:09, 4.26it/s]
Epoch 1: 43%	226/521 [00:54<01:09, 4.26it/s]
Epoch 1: 44%	227/521 [00:54<01:09, 4.26it/s]
Epoch 1: 44%	228/521 [00:54<01:08, 4.26it/s]
Epoch 1: 44%	229/521 [00:54<01:08, 4.26it/s]
Epoch 1: 44%	230/521 [00:54<01:08, 4.25it/s]
Epoch 1: 44%	231/521 [00:55<01:08, 4.24it/s]
Epoch 1: 45%	232/521 [00:55<01:07, 4.25it/s]
Epoch 1: 45%	233/521 [00:55<01:07, 4.25it/s]
Epoch 1: 45%	234/521 [00:55<01:07, 4.26it/s]
Epoch 1: 45%	235/521 [00:56<01:07, 4.25it/s]
Epoch 1: 45%	236/521 [00:56<01:07, 4.24it/s]
Epoch 1: 45%	237/521 [00:56<01:06, 4.25it/s]
Epoch 1: 46%	238/521 [00:56<01:06, 4.24it/s]
Epoch 1: 46%	239/521 [00:57<01:06, 4.23it/s]
Epoch 1: 46%	240/521 [00:57<01:06, 4.24it/s]
Epoch 1: 46%	241/521 [00:57<01:06, 4.24it/s]
Epoch 1: 46%	242/521 [00:57<01:05, 4.25it/s]
Epoch 1: 47%	243/521 [00:58<01:05, 4.24it/s]
Epoch 1: 47%	244/521 [00:58<01:05, 4.23it/s]
Epoch 1: 47%	245/521 [00:58<01:05, 4.23it/s]
Epoch 1: 47%	246/521 [00:58<01:05, 4.23it/s]
Epoch 1: 47%	247/521 [00:58<01:04, 4.23it/s]
Epoch 1: 48%	248/521 [00:59<01:04, 4.22it/s]
Epoch 1: 48%	249/521 [00:59<01:04, 4.24it/s]
Epoch 1: 48%	250/521 [00:59<01:03, 4.24it/s]
Epoch 1: 48%	251/521 [00:59<01:03, 4.24it/s]
Epoch 1: 48%	252/521 [01:00<01:03, 4.23it/s]
Epoch 1: 49%	253/521 [01:00<01:03, 4.22it/s]
Epoch 1: 49%	254/521 [01:00<01:03, 4.22it/s]
Epoch 1: 49%	255/521 [01:00<01:02, 4.22it/s]
Epoch 1: 49%	256/521 [01:01<01:02, 4.23it/s]
Epoch 1: 49%	257/521 [01:01<01:02, 4.23it/s]
Epoch 1: 50%	258/521 [01:01<01:02, 4.23it/s]
Epoch 1: 50%	259/521 [01:01<01:02, 4.21it/s]
Epoch 1: 50%	260/521 [01:02<01:01, 4.22it/s]
Epoch 1: 50%	261/521 [01:02<01:01, 4.22it/s]
Epoch 1: 50%	262/521 [01:02<01:01, 4.21it/s]
Epoch 1: 50%	263/521 [01:02<01:01, 4.22it/s]
Epoch 1: 51%	264/521 [01:03<01:00, 4.22it/s]
Epoch 1: 51%	265/521 [01:03<01:00, 4.20it/s]
Epoch 1: 51%	266/521 [01:03<01:00, 4.20it/s]
Epoch 1: 51%	267/521 [01:03<01:00, 4.21it/s]
Epoch 1: 51%	268/521 [01:03<00:59, 4.22it/s]
Epoch 1: 52%	269/521 [01:04<00:59, 4.21it/s]
Epoch 1: 52%	270/521 [01:04<00:59, 4.20it/s]
Epoch 1: 52%	271/521 [01:04<00:59, 4.17it/s]
Epoch 1: 52%	272/521 [01:04<00:59, 4.18it/s]
Epoch 1: 52%	273/521 [01:05<00:58, 4.21it/s]
Epoch 1: 53%	274/521 [01:05<00:58, 4.21it/s]
Epoch 1: 53%	275/521 [01:05<00:58, 4.21it/s]
Epoch 1: 53%	276/521 [01:05<00:57, 4.23it/s]

Epoch 1: 53%	277/521 [01:06<00:57, 4.22it/s]
Epoch 1: 53%	278/521 [01:06<00:57, 4.20it/s]
Epoch 1: 54%	279/521 [01:06<00:57, 4.18it/s]
Epoch 1: 54%	280/521 [01:06<00:57, 4.19it/s]
Epoch 1: 54%	281/521 [01:07<00:57, 4.20it/s]
Epoch 1: 54%	282/521 [01:07<00:57, 4.19it/s]
Epoch 1: 54%	283/521 [01:07<00:56, 4.20it/s]
Epoch 1: 55%	284/521 [01:07<00:56, 4.21it/s]
Epoch 1: 55%	285/521 [01:08<00:56, 4.19it/s]
Epoch 1: 55%	286/521 [01:08<00:55, 4.20it/s]
Epoch 1: 55%	287/521 [01:08<00:55, 4.20it/s]
Epoch 1: 55%	288/521 [01:08<00:55, 4.21it/s]
Epoch 1: 55%	289/521 [01:08<00:55, 4.19it/s]
Epoch 1: 56%	290/521 [01:09<00:55, 4.19it/s]
Epoch 1: 56%	291/521 [01:09<00:54, 4.19it/s]
Epoch 1: 56%	292/521 [01:09<00:54, 4.18it/s]
Epoch 1: 56%	293/521 [01:09<00:54, 4.19it/s]
Epoch 1: 56%	294/521 [01:10<00:54, 4.18it/s]
Epoch 1: 57%	295/521 [01:10<00:54, 4.18it/s]
Epoch 1: 57%	296/521 [01:10<00:53, 4.18it/s]
Epoch 1: 57%	297/521 [01:10<00:53, 4.17it/s]
Epoch 1: 57%	298/521 [01:11<00:53, 4.19it/s]
Epoch 1: 57%	299/521 [01:11<00:53, 4.19it/s]
Epoch 1: 58%	300/521 [01:11<00:52, 4.18it/s]
Epoch 1: 58%	301/521 [01:11<00:52, 4.19it/s]
Epoch 1: 58%	302/521 [01:12<00:52, 4.20it/s]
Epoch 1: 58%	303/521 [01:12<00:51, 4.20it/s]
Epoch 1: 58%	304/521 [01:12<00:51, 4.19it/s]
Epoch 1: 59%	305/521 [01:12<00:51, 4.20it/s]
Epoch 1: 59%	306/521 [01:13<00:51, 4.21it/s]
Epoch 1: 59%	307/521 [01:13<00:51, 4.19it/s]
Epoch 1: 59%	308/521 [01:13<00:50, 4.19it/s]
Epoch 1: 59%	309/521 [01:13<00:50, 4.17it/s]
Epoch 1: 60%	310/521 [01:13<00:50, 4.16it/s]
Epoch 1: 60%	311/521 [01:14<00:50, 4.16it/s]
Epoch 1: 60%	312/521 [01:14<00:49, 4.18it/s]
Epoch 1: 60%	313/521 [01:14<00:49, 4.18it/s]
Epoch 1: 60%	314/521 [01:14<00:49, 4.17it/s]
Epoch 1: 60%	315/521 [01:15<00:49, 4.18it/s]
Epoch 1: 61%	316/521 [01:15<00:48, 4.19it/s]
Epoch 1: 61%	317/521 [01:15<00:48, 4.18it/s]
Epoch 1: 61%	318/521 [01:15<00:48, 4.17it/s]
Epoch 1: 61%	319/521 [01:16<00:48, 4.16it/s]
Epoch 1: 61%	320/521 [01:16<00:48, 4.17it/s]
Epoch 1: 62%	321/521 [01:16<00:48, 4.14it/s]
Epoch 1: 62%	322/521 [01:16<00:48, 4.12it/s]
Epoch 1: 62%	323/521 [01:17<00:47, 4.14it/s]
Epoch 1: 62%	324/521 [01:17<00:47, 4.14it/s]
Epoch 1: 62%	325/521 [01:17<00:47, 4.15it/s]
Epoch 1: 63%	326/521 [01:17<00:46, 4.16it/s]
Epoch 1: 63%	327/521 [01:18<00:46, 4.15it/s]
Epoch 1: 63%	328/521 [01:18<00:46, 4.15it/s]
Epoch 1: 63%	329/521 [01:18<00:46, 4.16it/s]
Epoch 1: 63%	330/521 [01:18<00:46, 4.15it/s]
Epoch 1: 64%	331/521 [01:19<00:45, 4.13it/s]
Epoch 1: 64%	332/521 [01:19<00:46, 4.09it/s]
Epoch 1: 64%	333/521 [01:19<00:44, 4.19it/s]
Epoch 1: 64%	334/521 [01:19<00:44, 4.18it/s]
Epoch 1: 64%	335/521 [01:20<00:44, 4.17it/s]
Epoch 1: 64%	336/521 [01:20<00:44, 4.15it/s]
Epoch 1: 65%	337/521 [01:20<00:44, 4.15it/s]
Epoch 1: 65%	338/521 [01:20<00:44, 4.15it/s]
Epoch 1: 65%	339/521 [01:20<00:43, 4.14it/s]
Epoch 1: 65%	340/521 [01:21<00:43, 4.13it/s]
Epoch 1: 65%	341/521 [01:21<00:43, 4.13it/s]
Epoch 1: 66%	342/521 [01:21<00:43, 4.14it/s]
Epoch 1: 66%	343/521 [01:21<00:42, 4.16it/s]
Epoch 1: 66%	344/521 [01:22<00:42, 4.14it/s]
Epoch 1: 66%	345/521 [01:22<00:42, 4.15it/s]
Epoch 1: 66%	346/521 [01:22<00:42, 4.16it/s]

Epoch 1: 67%		347/521 [01:22<00:41, 4.16it/s]
Epoch 1: 67%		348/521 [01:23<00:41, 4.14it/s]
Epoch 1: 67%		349/521 [01:23<00:41, 4.13it/s]
Epoch 1: 67%		350/521 [01:23<00:41, 4.13it/s]
Epoch 1: 67%		351/521 [01:23<00:41, 4.13it/s]
Epoch 1: 68%		352/521 [01:24<00:41, 4.11it/s]
Epoch 1: 68%		353/521 [01:24<00:40, 4.11it/s]
Epoch 1: 68%		354/521 [01:24<00:40, 4.11it/s]
Epoch 1: 68%		355/521 [01:24<00:40, 4.12it/s]
Epoch 1: 68%		356/521 [01:25<00:40, 4.12it/s]
Epoch 1: 69%		357/521 [01:25<00:39, 4.12it/s]
Epoch 1: 69%		358/521 [01:25<00:39, 4.11it/s]
Epoch 1: 69%		359/521 [01:25<00:39, 4.11it/s]
Epoch 1: 69%		360/521 [01:26<00:39, 4.11it/s]
Epoch 1: 69%		361/521 [01:26<00:38, 4.11it/s]
Epoch 1: 69%		362/521 [01:26<00:38, 4.11it/s]
Epoch 1: 70%		363/521 [01:26<00:38, 4.12it/s]
Epoch 1: 70%		364/521 [01:27<00:38, 4.11it/s]
Epoch 1: 70%		365/521 [01:27<00:37, 4.11it/s]
Epoch 1: 70%		366/521 [01:27<00:37, 4.10it/s]
Epoch 1: 70%		367/521 [01:27<00:37, 4.10it/s]
Epoch 1: 71%		368/521 [01:28<00:37, 4.11it/s]
Epoch 1: 71%		369/521 [01:28<00:37, 4.10it/s]
Epoch 1: 71%		370/521 [01:28<00:36, 4.10it/s]
Epoch 1: 71%		371/521 [01:28<00:36, 4.09it/s]
Epoch 1: 71%		372/521 [01:28<00:36, 4.09it/s]
Epoch 1: 72%		373/521 [01:29<00:36, 4.10it/s]
Epoch 1: 72%		374/521 [01:29<00:35, 4.09it/s]
Epoch 1: 72%		375/521 [01:29<00:35, 4.10it/s]
Epoch 1: 72%		376/521 [01:29<00:35, 4.11it/s]
Epoch 1: 72%		377/521 [01:30<00:35, 4.11it/s]
Epoch 1: 73%		378/521 [01:30<00:34, 4.11it/s]
Epoch 1: 73%		379/521 [01:30<00:34, 4.10it/s]
Epoch 1: 73%		380/521 [01:30<00:34, 4.11it/s]
Epoch 1: 73%		381/521 [01:31<00:34, 4.08it/s]
Epoch 1: 73%		382/521 [01:31<00:34, 4.07it/s]
Epoch 1: 74%		383/521 [01:31<00:33, 4.06it/s]
Epoch 1: 74%		384/521 [01:31<00:33, 4.07it/s]
Epoch 1: 74%		385/521 [01:32<00:33, 4.08it/s]
Epoch 1: 74%		386/521 [01:32<00:33, 4.08it/s]
Epoch 1: 74%		387/521 [01:32<00:32, 4.08it/s]
Epoch 1: 74%		388/521 [01:32<00:32, 4.08it/s]
Epoch 1: 75%		389/521 [01:33<00:32, 4.07it/s]
Epoch 1: 75%		390/521 [01:33<00:32, 4.08it/s]
Epoch 1: 75%		391/521 [01:33<00:32, 4.06it/s]
Epoch 1: 75%		392/521 [01:33<00:31, 4.06it/s]
Epoch 1: 75%		393/521 [01:34<00:31, 4.06it/s]
Epoch 1: 76%		394/521 [01:34<00:31, 4.07it/s]
Epoch 1: 76%		395/521 [01:34<00:30, 4.07it/s]
Epoch 1: 76%		396/521 [01:34<00:30, 4.05it/s]
Epoch 1: 76%		397/521 [01:35<00:30, 4.04it/s]
Epoch 1: 76%		398/521 [01:35<00:30, 4.04it/s]
Epoch 1: 77%		399/521 [01:35<00:30, 4.04it/s]
Epoch 1: 77%		400/521 [01:35<00:29, 4.06it/s]
Epoch 1: 77%		401/521 [01:36<00:29, 4.06it/s]
Epoch 1: 77%		402/521 [01:36<00:29, 4.06it/s]
Epoch 1: 77%		403/521 [01:36<00:29, 4.05it/s]
Epoch 1: 78%		404/521 [01:36<00:28, 4.04it/s]
Epoch 1: 78%		405/521 [01:37<00:28, 4.04it/s]
Epoch 1: 78%		406/521 [01:37<00:28, 4.06it/s]
Epoch 1: 78%		407/521 [01:37<00:28, 4.06it/s]
Epoch 1: 78%		408/521 [01:37<00:27, 4.04it/s]
Epoch 1: 79%		409/521 [01:38<00:27, 4.04it/s]
Epoch 1: 79%		410/521 [01:38<00:27, 4.05it/s]
Epoch 1: 79%		411/521 [01:38<00:27, 4.06it/s]
Epoch 1: 79%		412/521 [01:38<00:27, 4.03it/s]
Epoch 1: 79%		413/521 [01:39<00:26, 4.02it/s]
Epoch 1: 79%		414/521 [01:39<00:26, 4.01it/s]
Epoch 1: 80%		415/521 [01:39<00:26, 3.96it/s]

Epoch 1: 80%	410/521 [01:39<00:27, 3.82it/s]
Epoch 1: 80%	417/521 [01:40<00:28, 3.66it/s]
Epoch 1: 80%	418/521 [01:40<00:28, 3.63it/s]
Epoch 1: 80%	419/521 [01:40<00:28, 3.58it/s]
Epoch 1: 81%	420/521 [01:41<00:27, 3.66it/s]
Epoch 1: 81%	421/521 [01:41<00:26, 3.76it/s]
Epoch 1: 81%	422/521 [01:41<00:25, 3.82it/s]
Epoch 1: 81%	423/521 [01:41<00:25, 3.88it/s]
Epoch 1: 81%	424/521 [01:41<00:24, 3.94it/s]
Epoch 1: 82%	425/521 [01:42<00:24, 3.97it/s]
Epoch 1: 82%	426/521 [01:42<00:23, 3.96it/s]
Epoch 1: 82%	427/521 [01:42<00:23, 3.97it/s]
Epoch 1: 82%	428/521 [01:42<00:23, 3.99it/s]
Epoch 1: 82%	429/521 [01:43<00:23, 3.99it/s]
Epoch 1: 83%	430/521 [01:43<00:22, 3.98it/s]
Epoch 1: 83%	431/521 [01:43<00:22, 4.01it/s]
Epoch 1: 83%	432/521 [01:43<00:22, 4.03it/s]
Epoch 1: 83%	433/521 [01:44<00:21, 4.01it/s]
Epoch 1: 83%	434/521 [01:44<00:21, 4.01it/s]
Epoch 1: 83%	435/521 [01:44<00:21, 4.02it/s]
Epoch 1: 84%	436/521 [01:44<00:21, 4.02it/s]
Epoch 1: 84%	437/521 [01:45<00:20, 4.02it/s]
Epoch 1: 84%	438/521 [01:45<00:20, 4.02it/s]
Epoch 1: 84%	439/521 [01:45<00:20, 4.02it/s]
Epoch 1: 84%	440/521 [01:45<00:20, 4.02it/s]
Epoch 1: 85%	441/521 [01:46<00:19, 4.02it/s]
Epoch 1: 85%	442/521 [01:46<00:19, 4.01it/s]
Epoch 1: 85%	443/521 [01:46<00:19, 4.01it/s]
Epoch 1: 85%	444/521 [01:46<00:19, 4.01it/s]
Epoch 1: 85%	445/521 [01:47<00:18, 4.03it/s]
Epoch 1: 86%	446/521 [01:47<00:18, 4.02it/s]
Epoch 1: 86%	447/521 [01:47<00:18, 4.01it/s]
Epoch 1: 86%	448/521 [01:47<00:18, 4.01it/s]
Epoch 1: 86%	449/521 [01:48<00:17, 4.03it/s]
Epoch 1: 86%	450/521 [01:48<00:17, 4.00it/s]
Epoch 1: 87%	451/521 [01:48<00:17, 4.01it/s]
Epoch 1: 87%	452/521 [01:48<00:17, 4.02it/s]
Epoch 1: 87%	453/521 [01:49<00:16, 4.01it/s]
Epoch 1: 87%	454/521 [01:49<00:16, 4.01it/s]
Epoch 1: 87%	455/521 [01:49<00:16, 4.01it/s]
Epoch 1: 88%	456/521 [01:49<00:16, 4.03it/s]
Epoch 1: 88%	457/521 [01:50<00:15, 4.04it/s]
Epoch 1: 88%	458/521 [01:50<00:15, 4.03it/s]
Epoch 1: 88%	459/521 [01:50<00:15, 4.03it/s]
Epoch 1: 88%	460/521 [01:50<00:15, 4.02it/s]
Epoch 1: 88%	461/521 [01:51<00:14, 4.01it/s]
Epoch 1: 89%	462/521 [01:51<00:14, 4.01it/s]
Epoch 1: 89%	463/521 [01:51<00:14, 4.02it/s]
Epoch 1: 89%	464/521 [01:51<00:14, 4.01it/s]
Epoch 1: 89%	465/521 [01:52<00:13, 4.02it/s]
Epoch 1: 89%	466/521 [01:52<00:13, 4.02it/s]
Epoch 1: 90%	467/521 [01:52<00:13, 4.01it/s]
Epoch 1: 90%	468/521 [01:52<00:13, 4.01it/s]
Epoch 1: 90%	469/521 [01:53<00:12, 4.01it/s]
Epoch 1: 90%	470/521 [01:53<00:12, 4.01it/s]
Epoch 1: 90%	471/521 [01:53<00:12, 4.01it/s]
Epoch 1: 91%	472/521 [01:53<00:12, 4.02it/s]
Epoch 1: 91%	473/521 [01:54<00:11, 4.03it/s]
Epoch 1: 91%	474/521 [01:54<00:11, 4.02it/s]
Epoch 1: 91%	475/521 [01:54<00:11, 4.02it/s]
Epoch 1: 91%	476/521 [01:54<00:11, 4.02it/s]
Epoch 1: 92%	477/521 [01:55<00:10, 4.04it/s]
Epoch 1: 92%	478/521 [01:55<00:10, 4.04it/s]
Epoch 1: 92%	479/521 [01:55<00:10, 4.02it/s]
Epoch 1: 92%	480/521 [01:55<00:10, 4.02it/s]
Epoch 1: 92%	481/521 [01:56<00:09, 4.02it/s]
Epoch 1: 93%	482/521 [01:56<00:09, 4.02it/s]
Epoch 1: 93%	483/521 [01:56<00:09, 4.02it/s]
Epoch 1: 93%	484/521 [01:56<00:09, 4.02it/s]
Epoch 1: 93%	485/521 [01:57<00:08, 4.03it/s]

Epoch 1: 93% | 486/521 [01:57<00:08, 4.03it/s]  
Epoch 1: 93% | 487/521 [01:57<00:08, 4.02it/s]  
Epoch 1: 94% | 488/521 [01:57<00:08, 4.04it/s]  
Epoch 1: 94% | 489/521 [01:58<00:07, 4.03it/s]  
Epoch 1: 94% | 490/521 [01:58<00:07, 4.03it/s]  
Epoch 1: 94% | 491/521 [01:58<00:07, 4.03it/s]  
Epoch 1: 94% | 492/521 [01:58<00:07, 4.02it/s]  
Epoch 1: 95% | 493/521 [01:59<00:06, 4.02it/s]  
Epoch 1: 95% | 494/521 [01:59<00:06, 4.02it/s]  
Epoch 1: 95% | 495/521 [01:59<00:06, 4.03it/s]  
Epoch 1: 95% | 496/521 [01:59<00:06, 4.02it/s]  
Epoch 1: 95% | 497/521 [02:00<00:05, 4.02it/s]  
Epoch 1: 96% | 498/521 [02:00<00:05, 4.03it/s]  
Epoch 1: 96% | 499/521 [02:00<00:05, 4.03it/s]  
Epoch 1: 96% | 500/521 [02:00<00:05, 4.02it/s]  
Epoch 1: 96% | 501/521 [02:01<00:04, 4.02it/s]  
Epoch 1: 96% | 502/521 [02:01<00:04, 4.03it/s]  
Epoch 1: 97% | 503/521 [02:01<00:04, 4.04it/s]  
Epoch 1: 97% | 504/521 [02:01<00:04, 4.04it/s]  
Epoch 1: 97% | 505/521 [02:02<00:03, 4.04it/s]  
Epoch 1: 97% | 506/521 [02:02<00:03, 4.03it/s]  
Epoch 1: 97% | 507/521 [02:02<00:03, 4.04it/s]  
Epoch 1: 98% | 508/521 [02:02<00:03, 4.03it/s]  
Epoch 1: 98% | 509/521 [02:03<00:02, 4.01it/s]  
Epoch 1: 98% | 510/521 [02:03<00:02, 4.03it/s]  
Epoch 1: 98% | 511/521 [02:03<00:02, 4.00it/s]  
Epoch 1: 98% | 512/521 [02:03<00:02, 4.04it/s]  
Epoch 1: 98% | 513/521 [02:04<00:01, 4.04it/s]  
Epoch 1: 99% | 514/521 [02:04<00:01, 4.04it/s]  
Epoch 1: 99% | 515/521 [02:04<00:01, 4.04it/s]  
Epoch 1: 99% | 516/521 [02:04<00:01, 4.03it/s]  
Epoch 1: 99% | 517/521 [02:05<00:00, 4.05it/s]  
Epoch 1: 99% | 518/521 [02:05<00:00, 4.02it/s]  
Epoch 1: 100% | 519/521 [02:05<00:00, 4.03it/s]  
Epoch 1: 100% | 520/521 [02:05<00:00, 4.04it/s]  
Epoch 1: 100% | 521/521 [02:06<00:00, 4.13it/s]  
Epoch 1 - Loss: 102.2973, F1 SCORE: 0.9668  
Epoch 2: 100% | 521/521 [02:08<00:00, 4.05it/s]  
Epoch 2 - Loss: 31.3879, F1 SCORE: 0.9701  
Epoch 3: 100% | 521/521 [02:08<00:00, 4.04it/s]  
Epoch 3 - Loss: 13.5243, F1 SCORE: 0.9720  
Epoch 4: 100% | 521/521 [02:08<00:00, 4.04it/s]  
Epoch 4 - Loss: 7.6350, F1 SCORE: 0.9762  
Epoch 5: 100% | 521/521 [02:08<00:00, 4.05it/s]  
Epoch 5 - Loss: 3.6427, F1 SCORE: 0.9785  
Epoch 6: 100% | 521/521 [02:08<00:00, 4.06it/s]  
Epoch 6 - Loss: 3.7576, F1 SCORE: 0.9710  
Epoch 7: 100% | 521/521 [02:07<00:00, 4.08it/s]  
Epoch 7 - Loss: 2.1331, F1 SCORE: 0.9729  
Epoch 8: 100% | 521/521 [02:07<00:00, 4.07it/s]  
Epoch 8 - Loss: 1.5416, F1 SCORE: 0.9752  
Epoch 9: 100% | 521/521 [02:08<00:00, 4.07it/s]  
Epoch 9 - Loss: 1.3186, F1 SCORE: 0.9701  
Epoch 10: 100% | 521/521 [02:07<00:00, 4.07it/s]  
Epoch 10 - Loss: 1.2038, F1 SCORE: 0.9757  
Best DeBERTa Accuracy: 0.9785046728971962

```

def predict_news(text):
    """
    Predict whether a given text is real or fake news.

    Args:
        text (str): The text to classify

    Returns:
        dict: A dictionary containing the prediction ('real' or 'fake') and the confidence scores
    """
    # Load the best model if not already loaded
    if not hasattr(predict_news, 'model_loaded'):
        model.load_state_dict(torch.load("deberta_best.pt", map_location=device))
        model.eval()
        predict_news.model_loaded = True

    # Tokenize the input text
    inputs = tokenizer(text, return_tensors="pt", truncation=True, padding=True, max_length=128)
    inputs = {k: v.to(device) for k, v in inputs.items()}

    # Make prediction
    with torch.no_grad():
        outputs = model(**inputs)

    # Get probabilities using softmax
    probs = torch.nn.functional.softmax(outputs.logits, dim=-1)
    probs = probs.cpu().numpy()[0]

    # Get the predicted label
    predicted_label_idx = torch.argmax(outputs.logits).item()

    # Get the original class names from the LabelEncoder
    class_names = le.classes_

    # Create confidence dictionary with proper class names
    confidence = {class_names[i]: float(probs[i]) for i in range(len(class_names))}

    # Determine the predicted class
    predicted_class = class_names[predicted_label_idx]

    return {
        'prediction': predicted_class,
        'confidence': confidence
    }

```

```

prediction = predict_news("India records yet another single-day rise of over 28000 new cases while m
print(prediction)

```

```

 {'prediction': 'fake', 'confidence': {'fake': 0.9999793767929077, 'real': 2.0589308405760676e-05}
 

```

```

prediction = predict_news("Last note: Washington DC's total test count fell by ~22% presumably pulli
print(prediction)

```

```

 {'prediction': 'real', 'confidence': {'fake': 0.0004962331149727106, 'real': 0.9995037317276001}
 

```

```

def predict_with_explanation(text, num_features=10):
    """
    Predict and explain the classification of news text

```