In [1]:
```
import numpy as np
import matplotlib.pyplot as plt
import tensorflow as tf
from tensorflow import keras
from tensorflow.keras import layers
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Embedding,Dense,Flatten,SimpleRNN,LSTM,GRU
from tensorflow.keras.datasets import imdb
```

```
WARNING:tensorflow:From D:\JUPYTER FOLDER\Lib\site-packages\keras\src\losses.py:2976: The name tf.losses.spa
rse_softmax_cross_entropy is deprecated. Please use tf.compat.v1.losses.sparse_softmax_cross_entropy instea
d.
```

In [2]:
```
def load_imdb_data(max_features,maxlen):
    (x_train,y_train),(x_test,y_test)=imdb.load_data(num_words=max_features)
    x_train=tf.keras.preprocessing.sequence.pad_sequences(x_train,maxlen=maxlen)
    x_test=tf.keras.preprocessing.sequence.pad_sequences(x_test,maxlen=maxlen)
    return x_train,y_train,x_test,y_test
```

In [3]:
```
def gru_model2(max_features,maxlen,opti):
    model=Sequential([
        Embedding(max_features,32,input_length=maxlen),
        GRU(32),
        Dense(1,activation='sigmoid')
    ])
    model.compile(loss='binary_crossentropy',metrics=['accuracy'],optimizer=opti)
    return model
```

In [5]:
```
def training_and_evaluation2(model,x_train,y_train,x_test,y_test,epochs=3,batch_size=128):
    history=model.fit(x_train,y_train,epochs=epochs,batch_size=batch_size,validation_split=0.2)
    loss,accuracy=model.evaluate(x_test,y_test)
    print(f'accuracy:  {accuracy}')
    print(f'loss: {loss}')

    return history,loss,accuracy
```

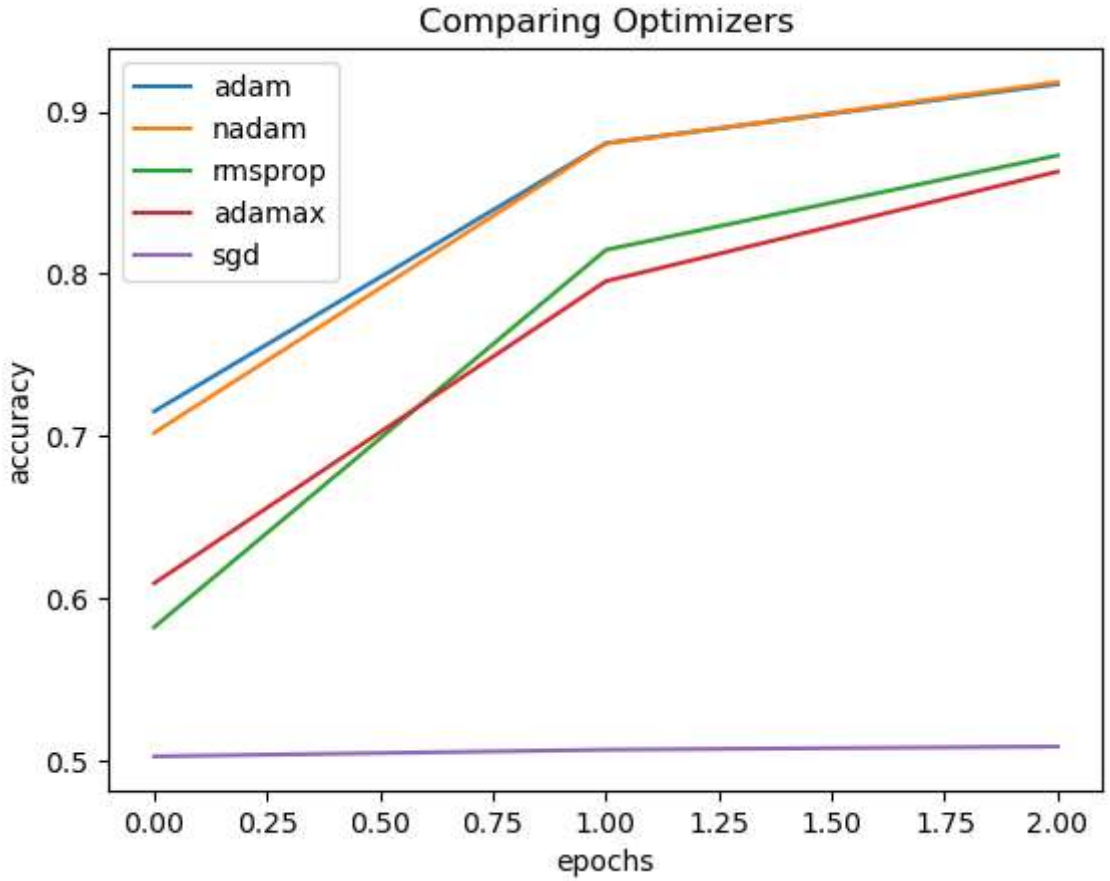
In [7]:
```
max_features=10000
maxlen=100
```

In [8]:
```
word_index=imdb.get_word_index()
reversed_word_index=dict([(value,key) for(key,value) in word_index.items()])
x_train,y_train,x_test,y_test=load_imdb_data(max_features,maxlen)
```

In [9]:
```
gru1=gru_model2(max_features,maxlen,'adam')
gru2=gru_model2(max_features,maxlen,'nadam')
gru3=gru_model2(max_features,maxlen,'rmsprop')
gru4=gru_model2(max_features,maxlen,'adamax')
gru5=gru_model2(max_features,maxlen,'sgd')

history1,loss,accuracy=training_and_evaluation2(gru1,x_train,y_train,x_test,y_test)
history2,loss,accuracy=training_and_evaluation2(gru2,x_train,y_train,x_test,y_test)
history3,loss,accuracy=training_and_evaluation2(gru3,x_train,y_train,x_test,y_test)
history4,loss,accuracy=training_and_evaluation2(gru4,x_train,y_train,x_test,y_test)
history5,loss,accuracy=training_and_evaluation2(gru5,x_train,y_train,x_test,y_test)

plt.title('Comparing Optimizers')
plt.plot(history1.history['accuracy'],label='adam')
plt.plot(history2.history['accuracy'],label='nadam')
plt.plot(history3.history['accuracy'],label='rmsprop')
plt.plot(history4.history['accuracy'],label='adamax')
plt.plot(history5.history['accuracy'],label='sgd')
plt.xlabel('epochs')
plt.ylabel('accuracy')
plt.legend()
plt.show()
```

```
WARNING:tensorflow:From D:\JUPYTER FOLDER\Lib\site-packages\keras\src\backend.py:873: The name tf.get_defaul
t_graph is deprecated. Please use tf.compat.v1.get_default_graph instead.

WARNING:tensorflow:From D:\JUPYTER FOLDER\Lib\site-packages\keras\src\optimizers\__init__.py:309: The name t
f.train.Optimizer is deprecated. Please use tf.compat.v1.train.Optimizer instead.

Epoch 1/3
WARNING:tensorflow:From D:\JUPYTER FOLDER\Lib\site-packages\keras\src\utils\tf_utils.py:492: The name tf.rag
ged.RaggedTensorValue is deprecated. Please use tf.compat.v1.ragged.RaggedTensorValue instead.

WARNING:tensorflow:From D:\JUPYTER FOLDER\Lib\site-packages\keras\src\engine\base_layer_utils.py:384: The na
me tf.executing_eagerly_outside_functions is deprecated. Please use tf.compat.v1.executing_eagerly_outside_f
unctions instead.

157/157 [==============================] - 20s 107ms/step - loss: 0.5309 - accuracy: 0.7152 - val_loss: 0.37
47 - val_accuracy: 0.8384
Epoch 2/3
157/157 [==============================] - 23s 148ms/step - loss: 0.2962 - accuracy: 0.8806 - val_loss: 0.36
95 - val_accuracy: 0.8438
Epoch 3/3
157/157 [==============================] - 24s 150ms/step - loss: 0.2225 - accuracy: 0.9169 - val_loss: 0.40
00 - val_accuracy: 0.8414
782/782 [==============================] - 24s 30ms/step - loss: 0.4017 - accuracy: 0.8365
accuracy:  0.8364800214767456
loss: 0.4016941487789154
Epoch 1/3
157/157 [==============================] - 27s 142ms/step - loss: 0.5417 - accuracy: 0.7020 - val_loss: 0.37
61 - val_accuracy: 0.8342
Epoch 2/3
157/157 [==============================] - 22s 142ms/step - loss: 0.2913 - accuracy: 0.8802 - val_loss: 0.39
31 - val_accuracy: 0.8278
Epoch 3/3
157/157 [==============================] - 24s 156ms/step - loss: 0.2161 - accuracy: 0.9182 - val_loss: 0.37
45 - val_accuracy: 0.8400
782/782 [==============================] - 29s 37ms/step - loss: 0.3776 - accuracy: 0.8425
accuracy:  0.8424800038337708
loss: 0.3775532841682434
Epoch 1/3
157/157 [==============================] - 20s 103ms/step - loss: 0.6708 - accuracy: 0.5822 - val_loss: 0.62
96 - val_accuracy: 0.6692
Epoch 2/3
157/157 [==============================] - 9s 55ms/step - loss: 0.4084 - accuracy: 0.8148 - val_loss: 0.4470
- val_accuracy: 0.7942
```

```
Epoch 3/3
157/157 [==============================] - 8s 54ms/step - loss: 0.3081 - accuracy: 0.8730 - val_loss: 0.3559
- val_accuracy: 0.8440
782/782 [==============================] - 10s 12ms/step - loss: 0.3506 - accuracy: 0.8462
accuracy:  0.8461999893188477
loss: 0.35055413842201233
Epoch 1/3
157/157 [==============================] - 11s 52ms/step - loss: 0.6690 - accuracy: 0.6093 - val_loss: 0.556
0 - val_accuracy: 0.7228
Epoch 2/3
157/157 [==============================] - 8s 53ms/step - loss: 0.4438 - accuracy: 0.7954 - val_loss: 0.3908
- val_accuracy: 0.8260
Epoch 3/3
157/157 [==============================] - 8s 54ms/step - loss: 0.3254 - accuracy: 0.8630 - val_loss: 0.3533
- val_accuracy: 0.8480
782/782 [==============================] - 10s 12ms/step - loss: 0.3524 - accuracy: 0.8438
accuracy:  0.8438400030136108
loss: 0.35239067673683167
Epoch 1/3
157/157 [==============================] - 10s 53ms/step - loss: 0.6931 - accuracy: 0.5026 - val_loss: 0.693
0 - val_accuracy: 0.5136
Epoch 2/3
157/157 [==============================] - 8s 49ms/step - loss: 0.6930 - accuracy: 0.5066 - val_loss: 0.6930
- val_accuracy: 0.5196
Epoch 3/3
157/157 [==============================] - 8s 49ms/step - loss: 0.6930 - accuracy: 0.5086 - val_loss: 0.6930
- val_accuracy: 0.5202
782/782 [==============================] - 9s 12ms/step - loss: 0.6929 - accuracy: 0.5174
accuracy:  0.5173599720001221
loss: 0.6929375529289246
```


Comparing Optimizers
adam
nadam
rmsprop
adamax
sgd
accuracy
epochs
0.5
0.6
0.7
0.8
0.9
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00

In [ ]: