cosa c'è in questo notebook

Training di tre reticoli in grado di riconoscere dei segni gestuali alla lingua americana dei segni (AmericanSignLanguage).

Inoltre trovate il codice per applicare il modello a delle immagini.

Ho cercato di fare in modo che il codice sia abbastanza flessibile da poter fare tutti le varianti che mi sono venute in mente per cercare di migliorare i risultati. Ho provato a commentare il codice in modo che sia abbastanza chiaro.

Il dataset usato contiene circa 65 mila immagini. I 3600 * 24 fotogrammi, quindi la dimensione del dataset è circa 86 mila.

Ho provato a fare una cross validation con 5 fold ma ci vuole troppo tempo per cui ho deciso di usare solo 1 fold.

Ho provato anche a fare una cross validation per verificare quale fosse la dimensione ottimale del batch.

Ho provato a fare dei grafici per capire come si comportano i vari reticoli durante il training.

I reticoli sono abbastanza pesanti e ho dovuto ridurre la dimensione delle immagini per poter fare il training.

Ho provato a fare dei reticoli con meno parametri ma non ho ottenuto dei risultati soddisfacenti.

Ho provato a fare dei reticoli più pesanti ma non ho ottenuto dei risultati significativamente migliori.

Ho provato a fare dei reticoli con più layer convolutivi ma non ho ottenuto dei risultati significativamente migliori.

Ho provato a fare dei reticoli con più layer dense ma non ho ottenuto dei risultati significativamente migliori.

Ho provato a fare dei reticoli con più layer dense e con più layer convolutivi ma non ho ottenuto dei risultati significativamente migliori.

Ho provato a fare dei reticoli con layer di normalizzazione ma non ho ottenuto dei risultati significativamente migliori.

Ho provato a fare dei reticoli con layer di dropout ma non ho ottenuto dei risultati significativamente migliori.

Ho provato a fare dei reticoli con layer di pooling ma non ho ottenuto dei risultati significativamente migliori.

Ho provato a fare dei reticoli con layer di pooling e con layer di dropout ma non ho ottenuto dei risultati significativamente migliori.

Ho provato a fare dei reticoli con layer di normalizzazione e con layer di dropout ma non ho ottenuto dei risultati significativamente migliori.

Ho provato a fare dei reticoli con layer di normalizzazione e con layer di pooling ma non ho ottenuto dei risultati significativamente migliori.

Ho provato a fare dei reticoli con layer di normalizzazione e con layer di pooling e con layer di dropout ma non ho ottenuto dei risultati significativamente migliori.

Ho provato a fare dei reticoli con layer di pooling e con layer di dropout ma non ho ottenuto dei risultati significativamente migliori.

Ho provato a fare dei reticoli con layer di normalizzazione e

```
[0]: history = cat_static_C.fit_generator(
         train_generator,
         steps_per_epoch=100,
         validation_data=validation_generator,
         validation_steps=50,
         verbose=1,
         initial_epoch=0)
```

```
/usr/local/lib/python3.6/dist-packages/keras/engine/training.py:1915: UserWarning:
Using a generator with `use_multiprocessing=True` and multiple workers may result in duplicate data in the dataset. Hint: enable the dataset shuffle option in the generator
  UserWarning('Using a generator with `use_multiprocessing=True` and '
Epoch 1/50
100/100 [==============================] - 1000s 10s/step - loss: 0.8918 - acc: 0.5025 - val_loss:
Epoch 2/50
100/100 [==============================] - 1000s 10s/step - loss: 0.6931 - acc: 0.5000 - val_loss:
Epoch 3/50
100/100 [==============================] - 1000s 10s/step - loss: 0.6931 - acc: 0.5000 - val_loss:
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Epoch 5/50
100/100 [==============================] - 1000s 10s/step - loss: 0.6931 - acc: 0.5000 - val_loss:
Epoch 6/50
100/100 [==============================] - 1000s 10s/step - loss: 0.7000 - acc: 0.4750 - val_loss:
Epoch 7/50
100/100 [==============================] - 1000s 10s/step - loss: 0.6931 - acc: 0.5000 - val_loss:
Epoch 8/50
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Epoch 11/50
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Epoch 50/50
100/100 [==============================] - 1000s 10s/step - loss: 0.6931 - acc: 0.5000 - val_loss:
```

```
[0]: cat_static_C.save('models/cat_static_C.h5')
```

```
[0]: epoch = history.history['acc']
     val_epoch = history.history['val_acc']
     loss = history.history['loss']
     val_loss = history.history['val_loss']

     epochs = range(1, len(epoch))

     plt.plot(epochs, epoch, 'r', 'Training accuracy')
     plt.plot(epochs, val_epoch, 'b', 'Validation accuracy')
     plt.title('Training and validation accuracy')
     plt.legend()

     plt.figure()
```

```
<Figure size 432x288>
```


Output type: stream | Stream: stdout

cat_static_C VS cat_static_D

Convolutionale è senza dense e dropout. Confronto tra il modello C (5 layer 3X3kernel relative CNN) e il secondo esercizio dei modelli con dropout e 3 piccoli layer dense (dense di grande)

```
[0]: cat_static_D = keras.models.load_model('models/cat_static_D.h5')
     cat_static_D = keras.models.load_model('models/cat_static_D.h5')
```

Warning: Error in loadNamespace() : 'RcppEigen' not found in .lib.loc() or any of .libPaths, and dependency is not a standard or base package

```
[0]: train_generator = ImageDataGenerator(
         rescale=1./255,
         rotation_range=40,
         width_shift_range=0.2,
         height_shift_range=0.2,
         shear_range=0.2,
         zoom_range=0.2,
         horizontal_flip=True,
         fill_mode='nearest')

     train_generator = train_generator.flow_from_directory(train_dir, target_size=(150, 150), shuffle=Ture
                                                           class_mode='categorical', batch_size=32, seed=
```

```
Found 20000 images belonging to 2 classes.
```

```
[0]: validation_generator = test_datagen.flow_from_directory(validation_dir, target_size=(150, 150), shuffle=Ture
                                                             class_mode='categorical', batch_size=32, seed=
```

```
Found 2000 images belonging to 2 classes.
```

```
[0]: optimizer = RMSprop(lr=1e-4)
     cat_static_D.compile(loss='categorical_crossentropy', optimizer=optimizer,metrics=['acc'])
```

```
[0]: [<keras.layers.convolutional.Conv2D object at 0x7f8c7c7c7ac8>,
      <keras.layers.pooling.MaxPooling2D object at 0x7f8c7c7c7b70>,
      <keras.layers.convolutional.Conv2D object at 0x7f8c7c7c7cf8>,
      <keras.layers.pooling.MaxPooling2D object at 0x7f8c7c7c7d68>,
      <keras.layers.convolutional.Conv2D object at 0x7f8c7c7c7dd8>,
      <keras.layers.pooling.MaxPooling2D object at 0x7f8c7c7c7e48>,
      <keras.layers.core.Flatten object at 0x7f8c7c7c7eb8>,
      <keras.layers.core.Dense object at 0x7f8c7c7c7f28>,
      <keras.layers.core.Dense object at 0x7f8c7c7c7f98>,
      <keras.layers.core.Dense object at 0x7f8c7c7c7fd0>]
```

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     cat_static_D.compile(loss='categorical_crossentropy', optimizer=optimizer,metrics=['acc'])
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```

```
[0]: history = cat_static_D.fit_generator(train_generator,
         steps_per_epoch=100,
         epochs=50,
         validation_data=validation_generator,
         validation_steps=50,
         verbose=1,
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/usr/local/lib/python3.6/dist-packages/keras/engine/training.py:1915: UserWarning:
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Epoch 1/50
100/100 [==============================] - 1000s 10s/step - loss: 0.7000 - acc: 0.4969 - val_loss:
Epoch 2/50
100/100 [==============================] - 1000s 10s/step - loss: 0.6931 - acc: 0.5000 - val_loss:
Epoch 3/50
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Epoch 50/50
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```

```
[0]: epoch = history.history['acc']
     val_epoch = history.history['val_acc']
     loss = history.history['loss']
     val_loss = history.history['val_loss']

     epochs = range(1, len(epoch))

     plt.plot(epochs, epoch, 'r', 'Training accuracy')
     plt.plot(epochs, val_epoch, 'b', 'Validation accuracy')
     plt.title('Training and validation accuracy')
     plt.legend()

     plt.figure()
```

```
<Figure size 432x288>
```


Output type: stream | Stream: stdout

```
[0]: cat_static_D.save('models/cat_static_D.h5')
```

```
[0]: epoch = history.history['acc']
     val_epoch = history.history['val_acc']
     loss = history.history['loss']
     val_loss = history.history['val_loss']

     epochs = range(1, len(epoch))

     plt.plot(epochs, epoch, 'r', 'Training accuracy')
     plt.plot(epochs, val_epoch, 'b', 'Validation accuracy')
     plt.title('Training and validation accuracy')
     plt.legend()

     plt.figure()
```

```
<Figure size 432x288>
```


Output type: stream | Stream: stdout

```
[0]: cat_static_C.save('models/cat_static_C.h5')
```

```
[0]: epoch = history.history['acc']
     val_epoch = history.history['val_acc']
     loss = history.history['loss']
     val_loss = history.history['val_loss']

     epochs = range(1, len(epoch))

     plt.plot(epochs, epoch, 'r', 'Training accuracy')
     plt.plot(epochs, val_epoch, 'b', 'Validation accuracy')
     plt.title('Training and validation accuracy')
     plt.legend()

     plt.figure()
```

```
<Figure size 432x288>
```


Output type: stream | Stream: stdout

cat_static_D VS cat_static_C

cat_static_D è il modello, ma si vede che peggiorano (dice la scuola ecco comunque modi simili anche per cat_static_C - 0.5000000) ma si vede che

cat_static_C è migliore

```
[0]: model_1 = Sequential()
     model_1.add(cat_static_C)
     model_1.add(cat_static_D)
     model_1.compile(loss='categorical_crossentropy', optimizer=optimizer,metrics=['acc'])
     model_1.fit_generator(train_generator,
                           steps_per_epoch=100,
                           epochs=50,
                           validation_data=validation_generator,
                           validation_steps=50,
                           verbose=1,
                           initial_epoch=0)
```

```
Traceback (most recent call last):
  File "<ipynb_magic_1>", line 1, in <module>
NameError: name 'Sequential' is not defined
```

```
[0]: epoch = history.history['acc']
     val_epoch = history.history['val_acc']
     loss = history.history['loss']
     val_loss = history.history['val_loss']

     epochs = range(1, len(epoch))

     plt.plot(epochs, epoch, 'r', 'Training accuracy')
     plt.plot(epochs, val_epoch, 'b', 'Validation accuracy')
     plt.title('Training and validation accuracy')
     plt.legend()

     plt.figure()
```

```
<Figure size 432x288>
```


Output type: stream | Stream: stdout

```
[0]: model_1.save('models/model_1.h5')
```

```
[0]: !ls -lh models
```

```
total 1.1G
-rw-r--r-- 1 root root 1.1G Jun 15 16:44 model_1.h5
```

```
[0]: !cp models/cat_static_C.h5 /content
     !cp models/cat_static_D.h5 /content
     !cp models/model_1.h5 /content
     !ls -lh /content
```

```
total 1.1G
-rw-r--r-- 1 root root 1.1G Jun 15 16:44 model_1.h5
-rw-r--r-- 1 root root 1.1M Jun 15 16:44 cat_static_C.h5
-rw-r--r-- 1 root root 1.1M Jun 15 16:44 cat_static_D.h5
drwxr-xr-x 1 root root 4.0K Jun 15 16:43 sample_data
```

```
[0]: !zip -r /content.zip /content
     !ls -lh
```

```
  adding: content/ (stored 0%)
  adding: content/model_1.h5 (deflated 7%)
  adding: content/cat_static_C.h5 (deflated 7%)
  adding: content/cat_static_D.h5 (deflated 7%)
  adding: content/.ipynb_checkpoints/ (stored 0%)
  adding: content/.ipynb_checkpoints/Untitled0.ipynb.google.drive.dms (stored 0%)
  adding: content/.ipynb_checkpoints/Untitled0.ipynb.google.drive.dms.1 (stored 0%)
  adding: content/.ipynb_checkpoints/Untitled0.ipynb.google.drive.dms.2 (stored 0%)
  adding: content/.ipynb_checkpoints/Untitled0.ipynb.google.drive.dms.3 (stored 0%)
  adding: content/.ipynb_checkpoints/Untitled0.ipynb.google.drive.dms.4 (stored 0%)
  adding: content/.ipynb_checkpoints/Untitled0.ipynb.google.drive.dms.5 (stored 0%)
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.#MENU#{ text-transparent-overlay-color 0x0000ff; -webkit-text-stroke-color;
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