Applying LSTM neural networks to biological cell movement

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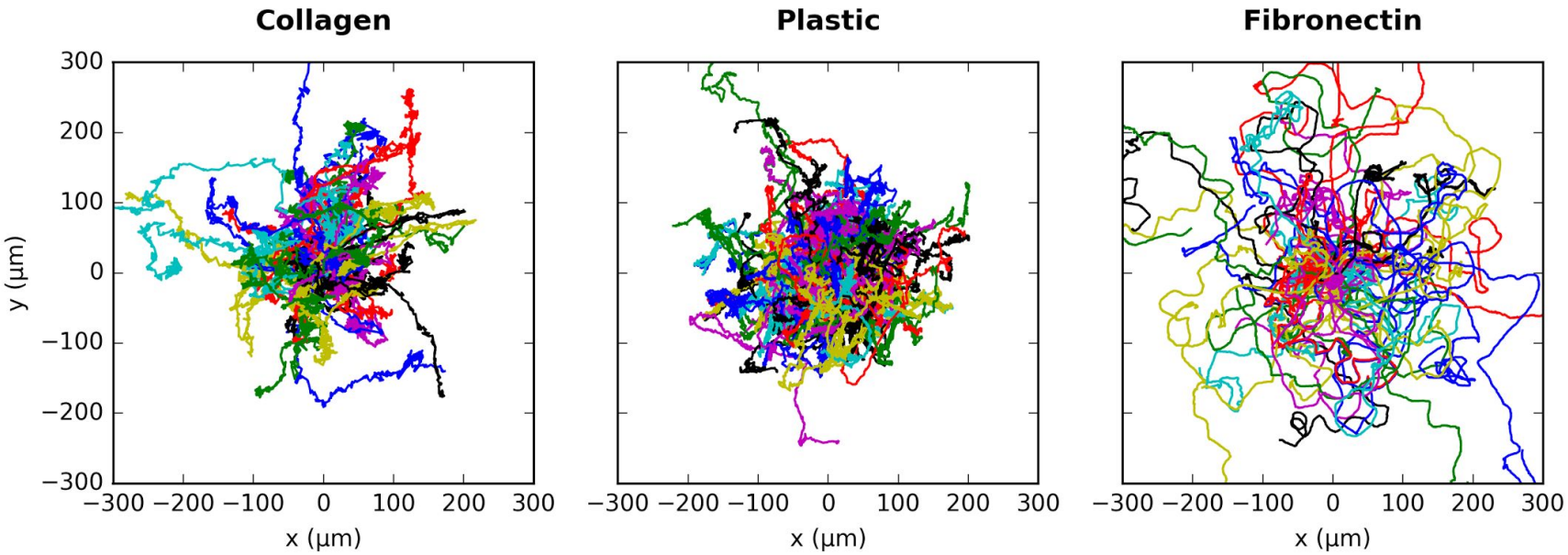
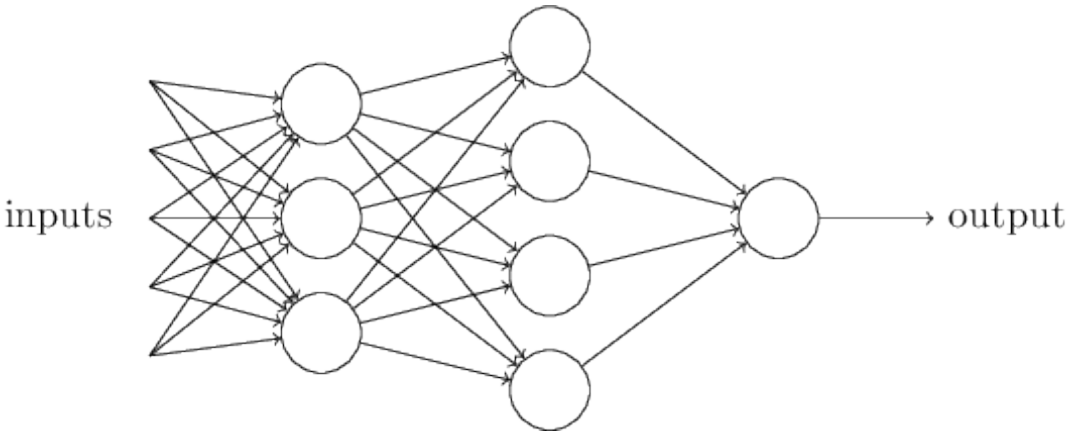
Data: Tumor cell trajectories



Neural Networks



0: 2 %
1: 1 %
2: 0 %
3: 0 %
4: 3 %
5: 90 %
6: 0 %
7: 1 %
8: 2 %
9: 1 %

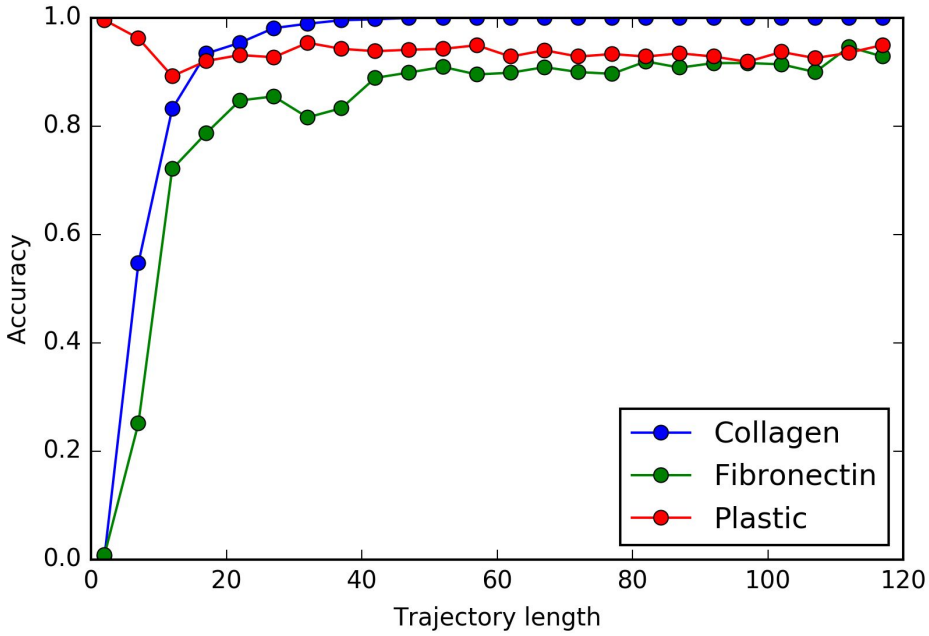
Implementation in keras

```
model = Sequential()
model.add(LSTM(input_dim=3, output_dim=10, return_sequences=True))
model.add(LSTM(output_dim=10, return_sequences=False))
model.add(Dense(output_dim=3))
model.add(Activation('softmax'))
model.compile(loss='categorical_crossentropy', optimizer='rmsprop')
```

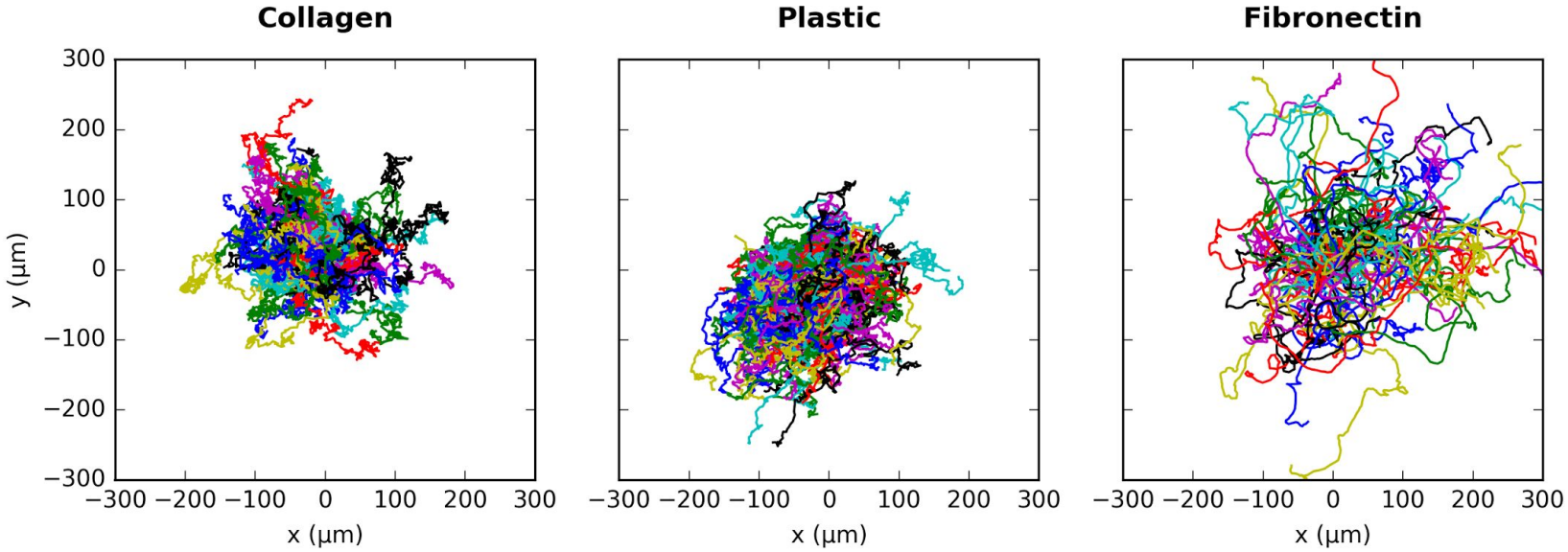

keras.io

1) Classify existing trajectories

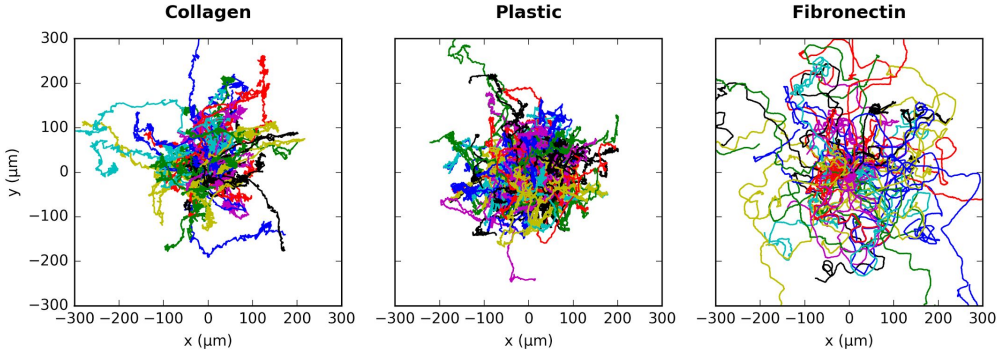
Accuracy: ~95 %



2) Generate new trajectories



Original:



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