

# RESURRECTING THE DEAD WITH DEEP LEARNING

ADITTHYA RAMAKRISHNAN

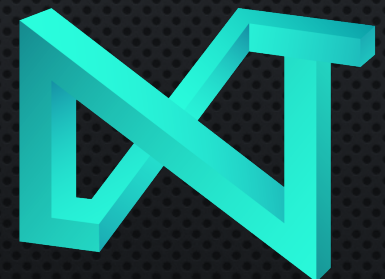
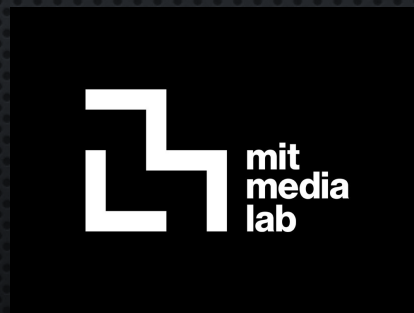


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- Amazing frameworks/libraries with strong support
- Really fast prototyping: Useful for research and testing out ideas
- Validation of complex ideas in few lines of code : readable and succinct
- Community





# What's with the clickbait talk title?

AS MENTIONED IN THE TALK DESCRIPTION,

- GENERATE LITERATURE IN THE STYLE OF DEAD WRITERS AND POETS LIKE NIETZSCHE, SHAKESPEARE AND ROBERT FROST.
- GENERATE BEAUTIFUL AI COMPOSED MUSIC INSPIRED BY THE LIKES OF MOZART, BEETHOVEN AND BACH.
- GENERATE LYRICS AND RAP BY TRAINING ON LENNON-MCCARTNEY & HAMILTON SONGS RESPECTIVELY.



# EXAMPLES



**DeepDrumpf** @DeepDrumpf · Mar 20

We have to end education. What they do is unbelievable, how bad. Nobody can do that like me. Believe me.



511



647



In reply to Andrej Karpathy



**DeepDrumpf** @DeepDrumpf · Mar 4

@karpathy [karpathy]? A disaster. But I think it's not a nice person.



3



11





PANDARUS:

Alas, I think he shall be come approached and the day  
When little strain would be attain'd into being never fed,  
And who is but a chain and subjects of his death,  
I should not sleep.

Second Senator:

They are away this miseries, produced upon my soul,  
Breaking and strongly should be buried, when I perish  
The earth and thoughts of many states.

DUKE VINCENTIO:

Well, your wit is in the care of side and that.

Second Lord:

They would be ruled after this chamber, and  
my fair nudes begun out of the fact, to be conveyed,  
Whose noble souls I'll have the heart of the wars.

Clown:

Come, sir, I will make did behold your worship.

VIOLA:

I'll drink it.

Naturalism and decision for the majority of Arab countries' capitalide was grounded by the Irish language by [[John Clair]], [[An Imperial Japanese Revolt]], associated with Guangzham's sovereignty. His generals were the powerful ruler of the Portugal in the [[Protestant Immineners]], which could be said to be directly in Cantonese Communication, which followed a ceremony and set inspired prison, training. The emperor travelled back to [[Antioch, Perth, October 25|21]] to note, the Kingdom of Costa Rica, unsuccessful fashioned the [[Thrales]], [[Cynth's Dajoard]], known in western [[Scotland]], near Italy to the conquest of India with the conflict. Copyright was the succession of independence in the slop of Syrian influence that was a famous German movement based on a more popular servicious, non-doctrinal and sexual power post. Many governments recognize the military housing of the [[Civil Liberalization and Infantry Resolution 265 National Party in Hungary]], that is sympathetic to be to the [[Punjab Resolution]] (PJS)[<http://www.humah.yahoo.com/guardian.cfm/7754800786d17551963s89.htm> Official economics Adjoint for the Nazism, Montgomery was swear to advance to the resources for those Socialism's rule, was starting to signing a major tripad of aid exile.]]

*"The surprised in investors weren't going to raise money. I'm not the company with the time there are all interesting quickly, don't have to get off the same programmers. There's a super-angel round fundraising, why do you can do. If you have a different physical investment are become in people who reduced in a startup with the way to argument the acquirer could see them just that you're also the founders will part of users' affords that and an alternation to the idea. [2] Don't work at first member to see the way kids will seem in advance of a bad successful startup. And if you have to act the big company too."*

Kim Kardashian Says She Wants To Sign Again

Kim Kardashian Says 'Idea' To Her Mean Baby!

Kim Kardashian Says North West Is Even More 'Important'

Kim Kardashian Says She Would Love Kanye

Kim Kardashian Says She's A Hero

Kim Kardashian Says She Looks Fake

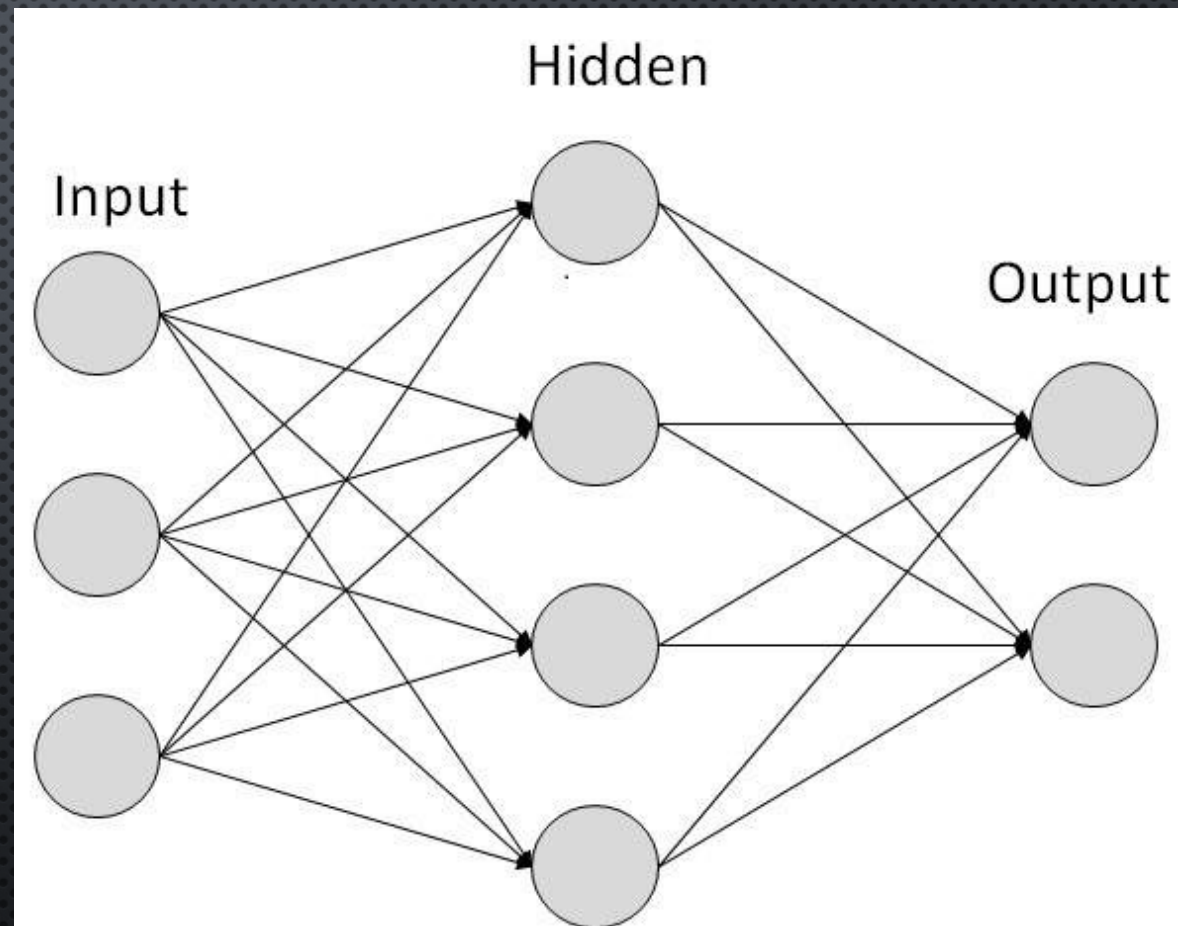
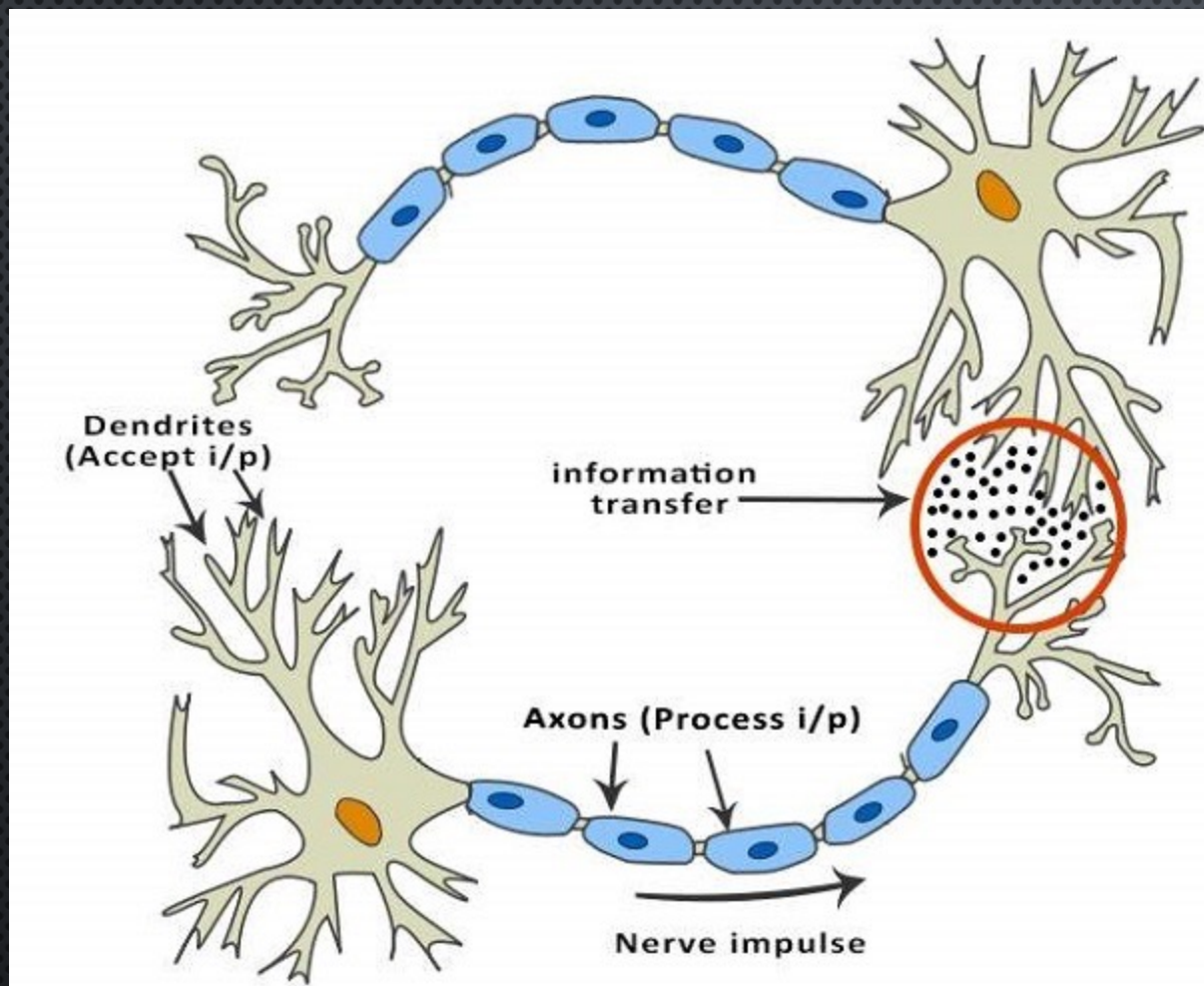
Kim Kardashian Says It Was Over Before They Call Her



# What makes neural networks different?

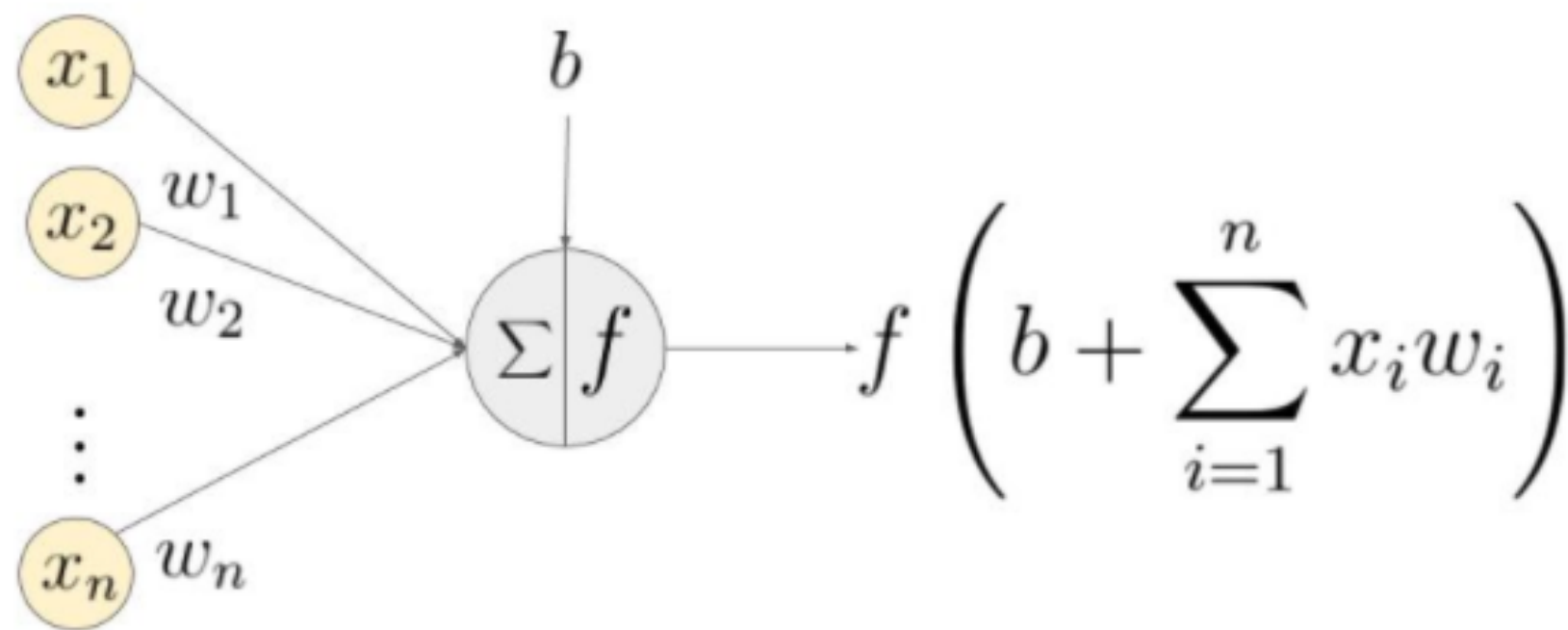






BIOLOGICALLY INSPIRED; CARICATURE OF WETWARE; ANALOGY OWL VS FIGHTER JET

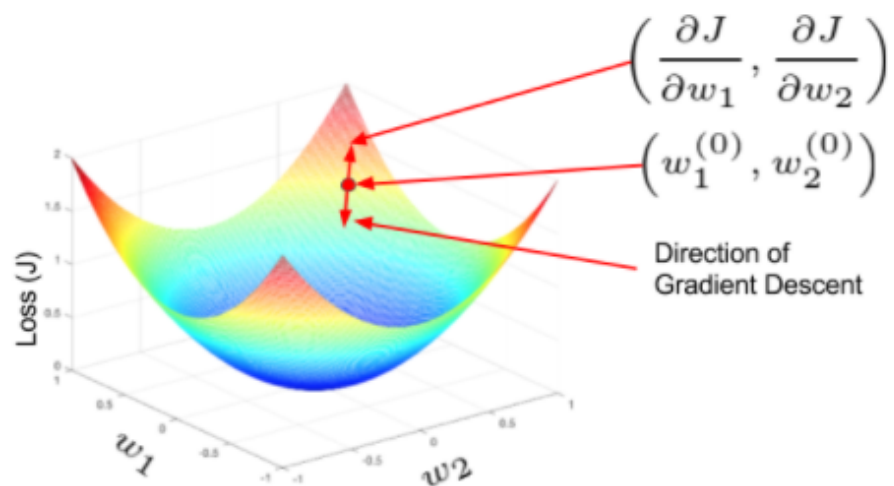




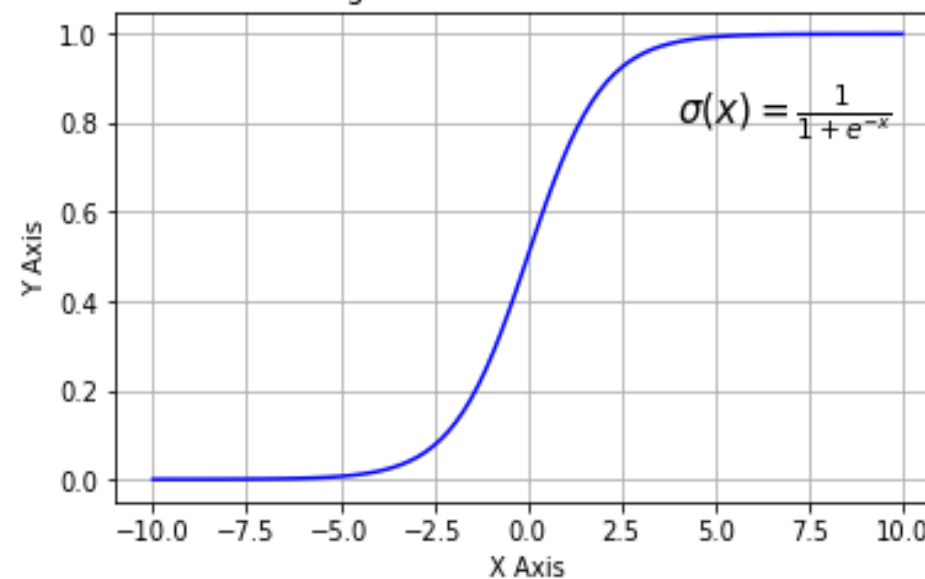
An example of a neuron showing the input ( $x_1 - x_n$ ), their corresponding weights ( $w_1 - w_n$ ), a bias ( $b$ ) and the activation function  $f$  applied to the weighted sum of the inputs.



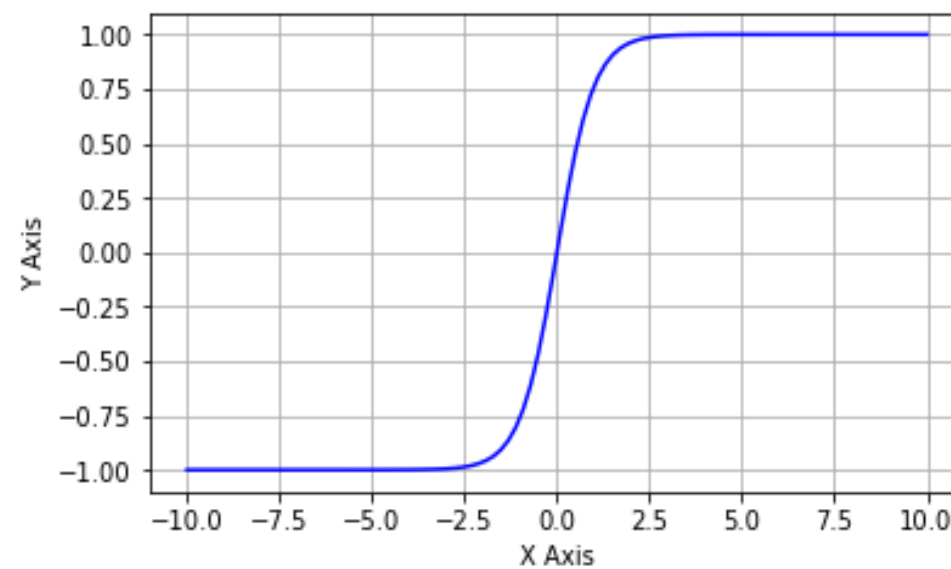
## Gradient Descent



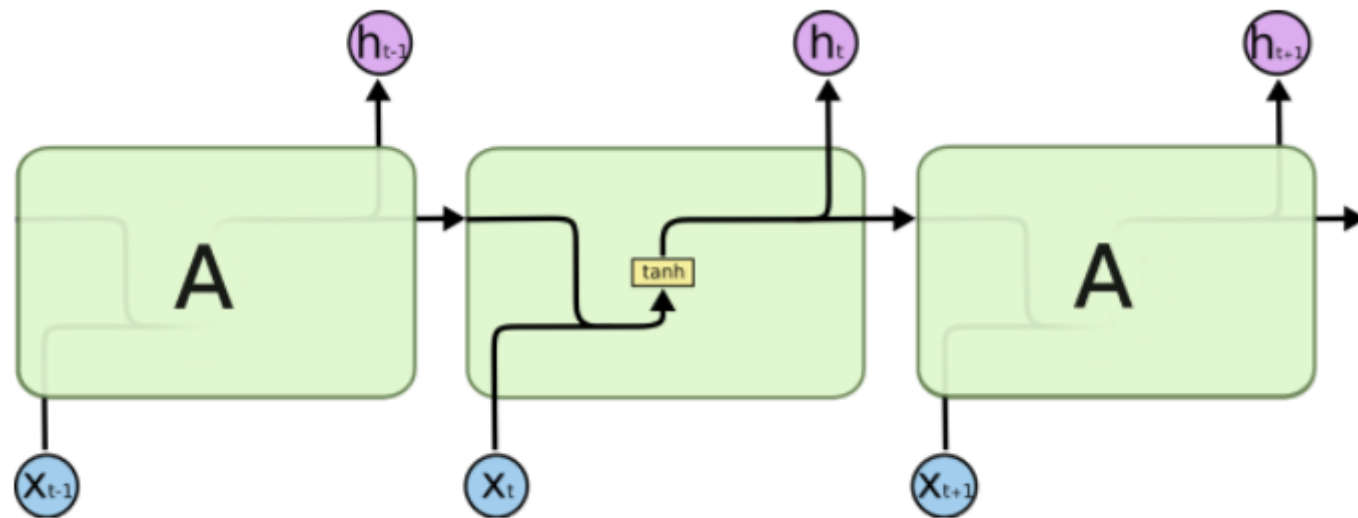
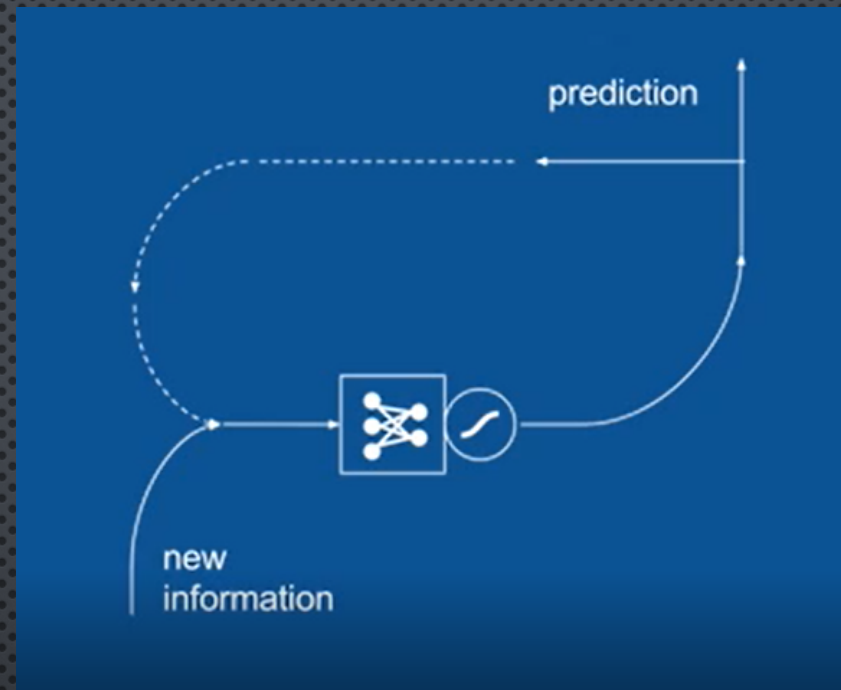
## Sigmoid Activation Function



## Tanh Activation Function



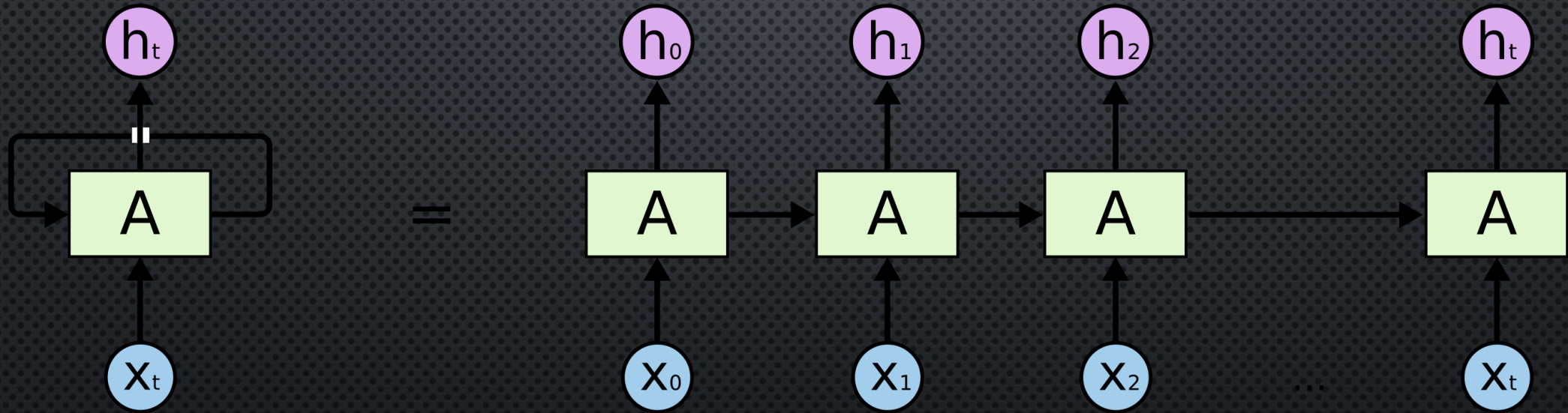




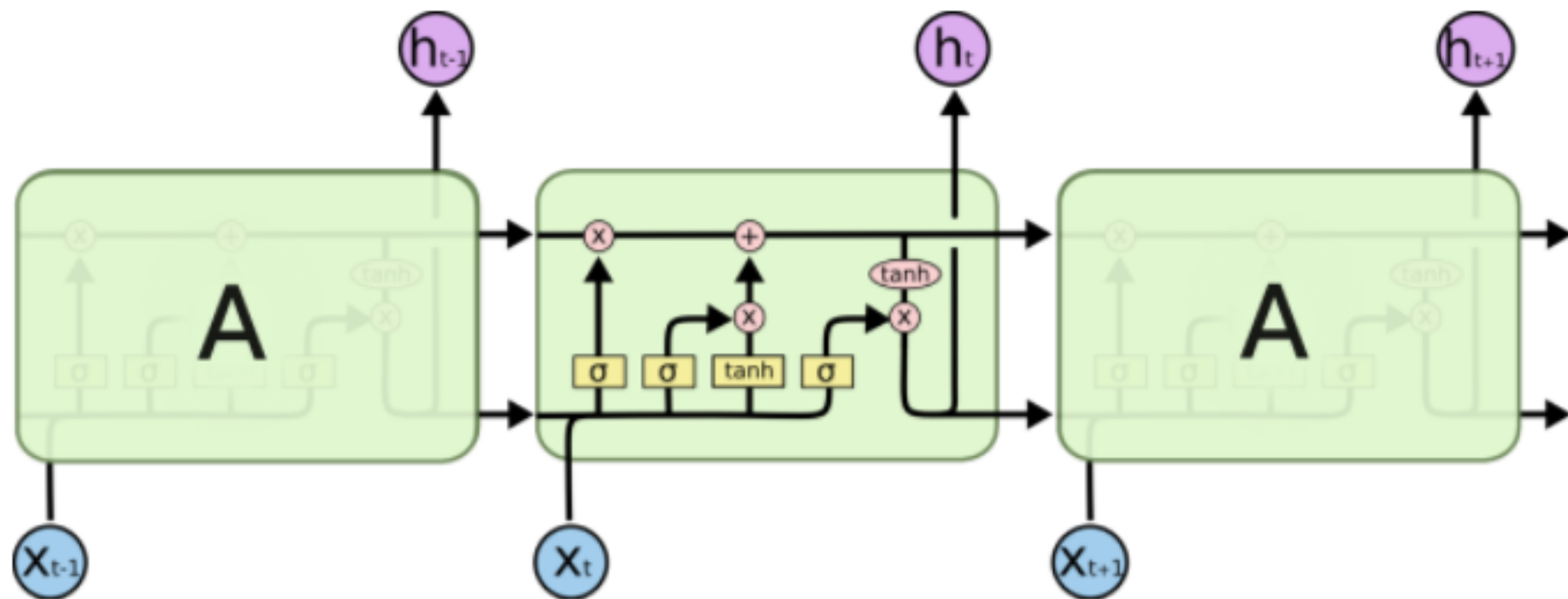
The repeating module in a standard RNN contains a single layer.



# UNROLLED RECURRENT NEURAL NETWORK







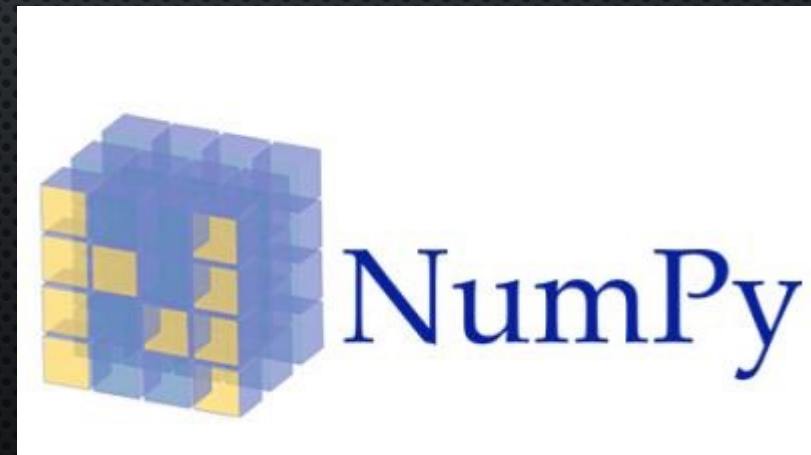
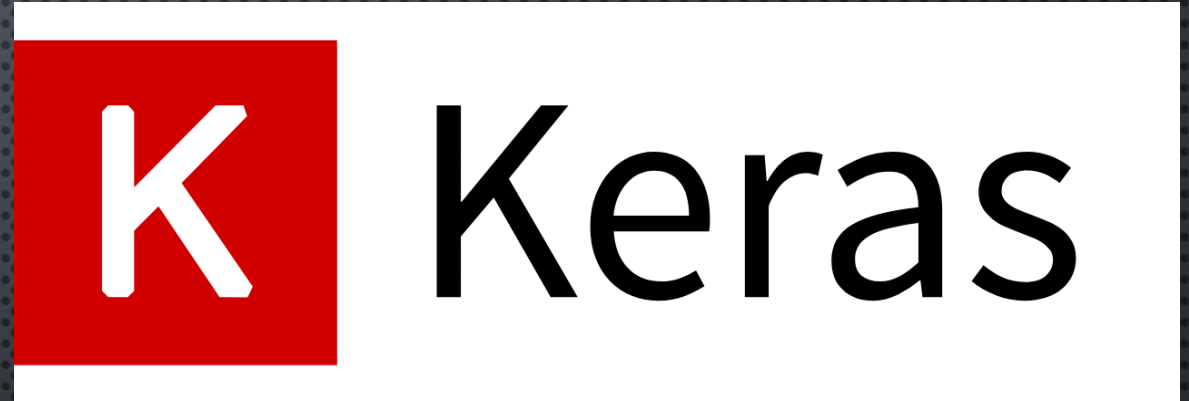
The repeating module in an LSTM contains four interacting layers.







What we're using today





## Import Modules

```
import sys
import numpy
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import Dropout
from keras.layers import LSTM
from keras.callbacks import ModelCheckpoint
from keras.utils import np_utils
```

```
filename = "corpus.txt"
raw_text = open(filename).read()
raw_text = raw_text.lower()
```

```
chars = sorted(list(set(raw_text)))
char_to_int = dict((c, i) for i, c in enumerate(chars))
int_to_char = dict((i, c) for i, c in enumerate(chars))
```





# Scrapy

```
Terminal

$ pip install scrapy
$ cat > myspider.py <<EOF
import scrapy

class BlogSpider(scrapy.Spider):
    name = 'blogspider'
    start_urls = ['https://blog.scrapinghub.com']

    def parse(self, response):
        for title in response.css('h2.entry-title'):
            yield {'title': title.css('a ::text').extract_first()}

        for next_page in response.css('div.prev-post > a'):
            yield response.follow(next_page, self.parse)
EOF
$ scrapy runspider myspider.py
```

## Beautiful Soup 4



## PDFMiner

<https://github.com/euske/pdfminer>



```
n_chars = len(raw_text)
n_vocab = len(chars)
```

```
seq_length = 100
dataX = []
dataY = []
for i in range(0, n_chars - seq_length, 1):
    seq_in = raw_text[i:i + seq_length]
    seq_out = raw_text[i + seq_length]
    dataX.append([char_to_int[char] for char in seq_in])
    dataY.append(char_to_int[seq_out])
n_patterns = len(dataX)
```



```

X = numpy.reshape(dataX, (n_patterns, seq_length, 1))
X = X / float(n_vocab)
y = np_utils.to_categorical(dataY)

```

One Hot Encoding

"a"	"abbreviations"		"zoology"	"zoom"
1	0		0	0
0	1		0	1
0	0		0	0
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
0	0		0	0
0	0		1	0
0	0		0	1



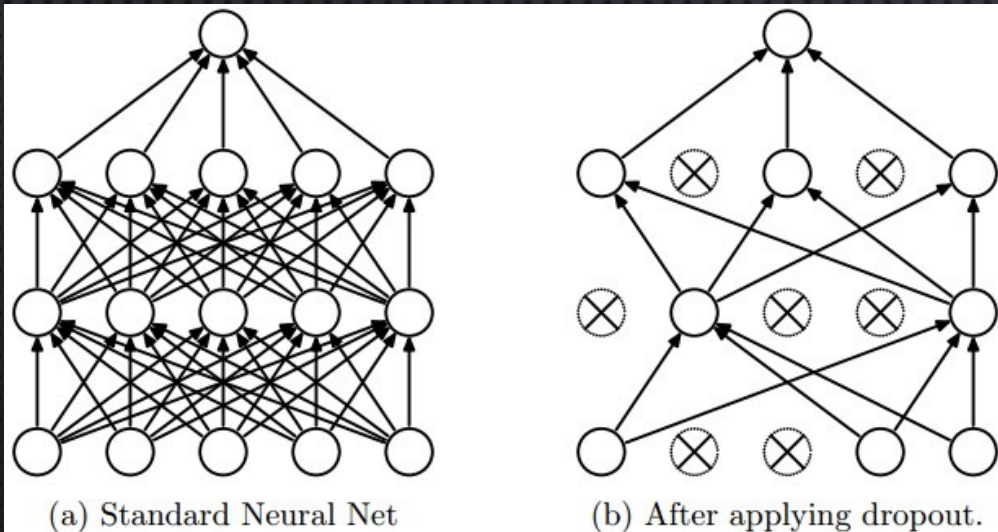
```

model = Sequential()
model.add(LSTM(256, input_shape=(X.shape[1], X.shape[2])))
model.add(Dropout(0.2))
model.add(Dense(y.shape[1], activation='softmax'))
model.compile(loss='categorical_crossentropy', optimizer='adam')

filepath="weights-improvement-{epoch:02d}-{loss:.4f}.hdf5"
checkpoint = ModelCheckpoint(filepath, monitor='loss', verbose=1, save_best_only=True, mode='min')
callbacks_list = [checkpoint]

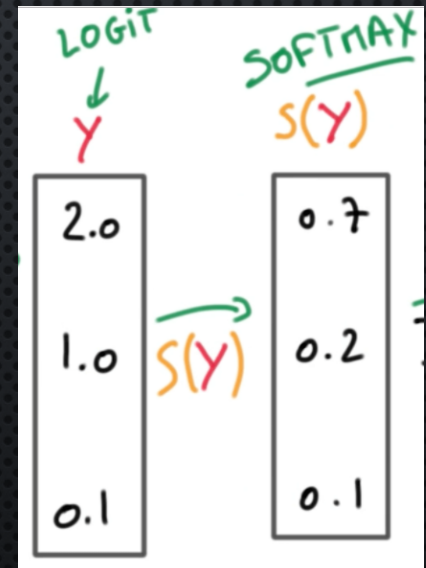
model.fit(X, y, epochs=20, batch_size=128, callbacks=callbacks_list)

```



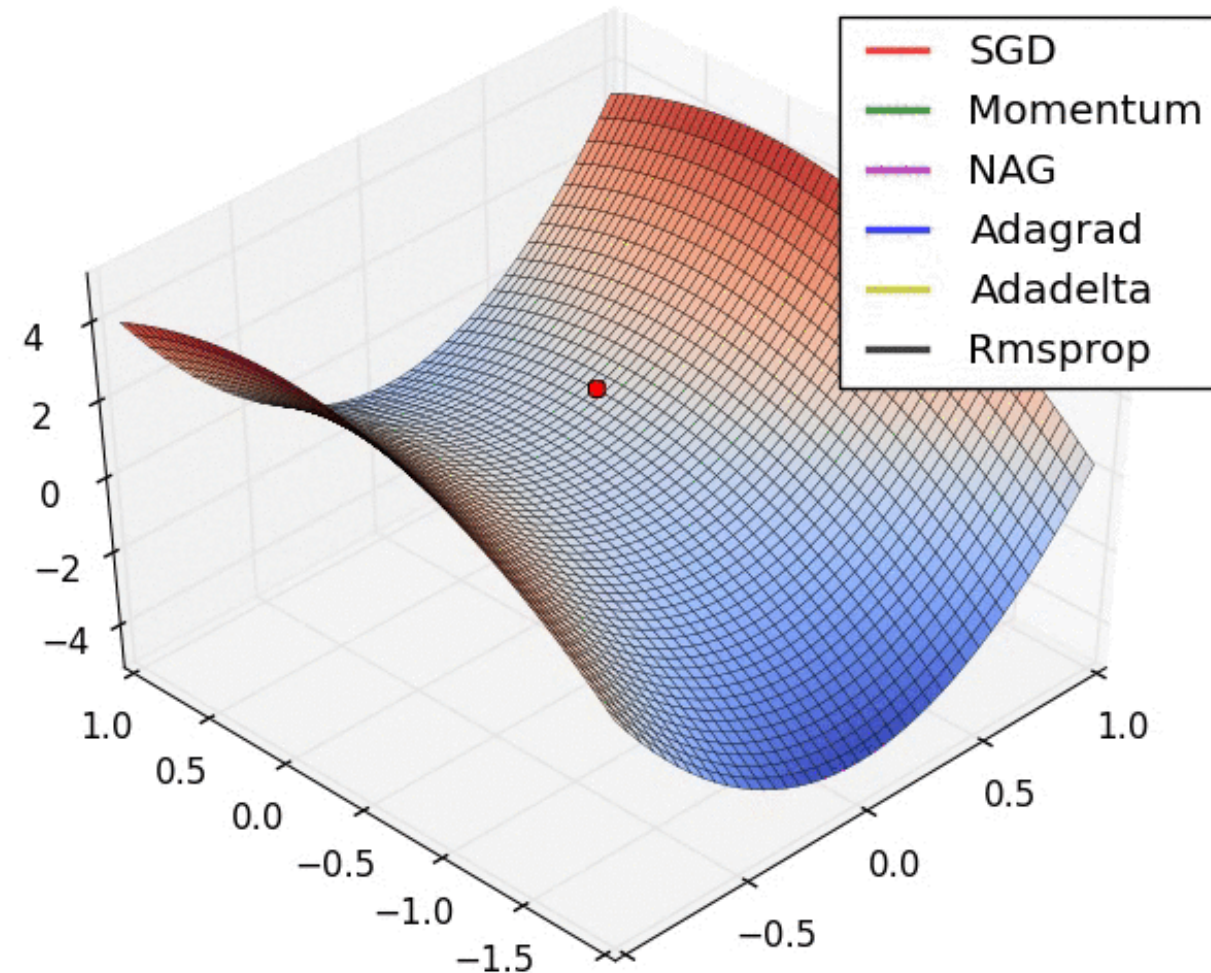
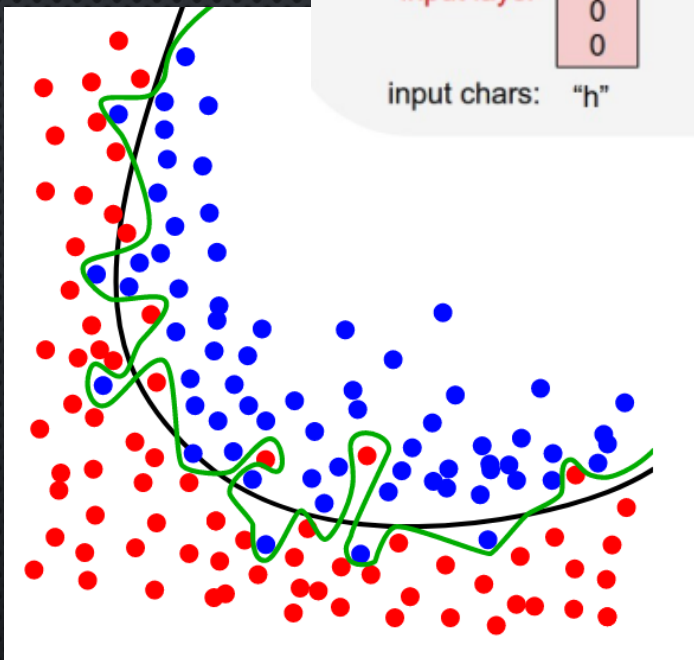
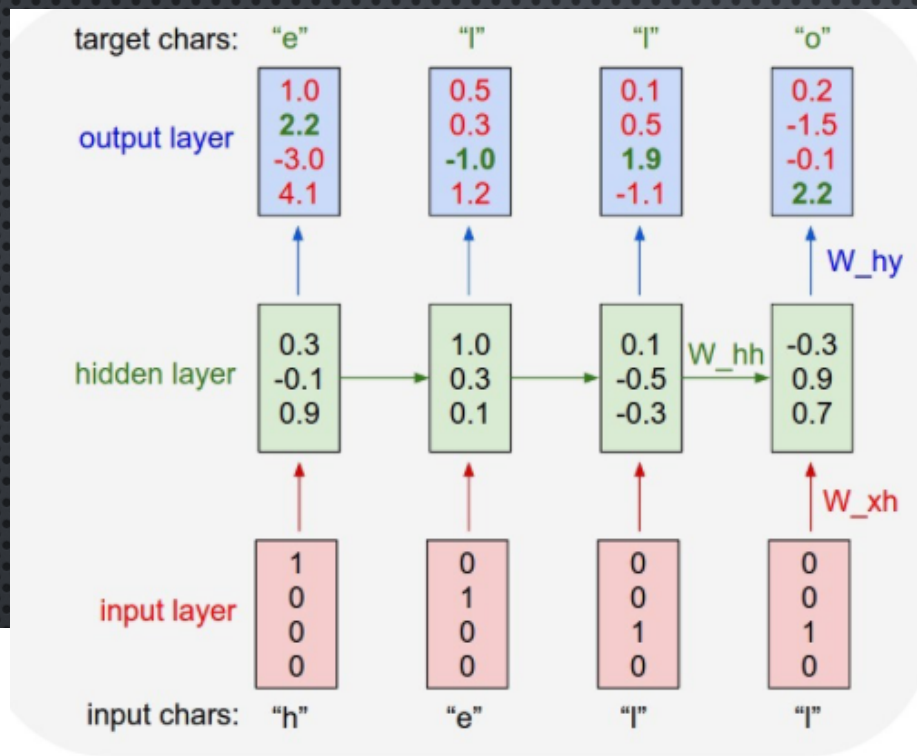
Softmax Function

$$\sigma(\mathbf{z})_j = \frac{e^{z_j}}{\sum_{k=1}^K e^{z_k}} \quad \text{for } j = 1, \dots, K.$$





# GRADIENT DESCENT OPTIMIZATION ALGORITHMS





# GENERATING TEXT

```
filename = "networkweightsfile.hdf5"
model.load_weights(filename)
model.compile(loss='categorical_crossentropy', optimizer='adam')

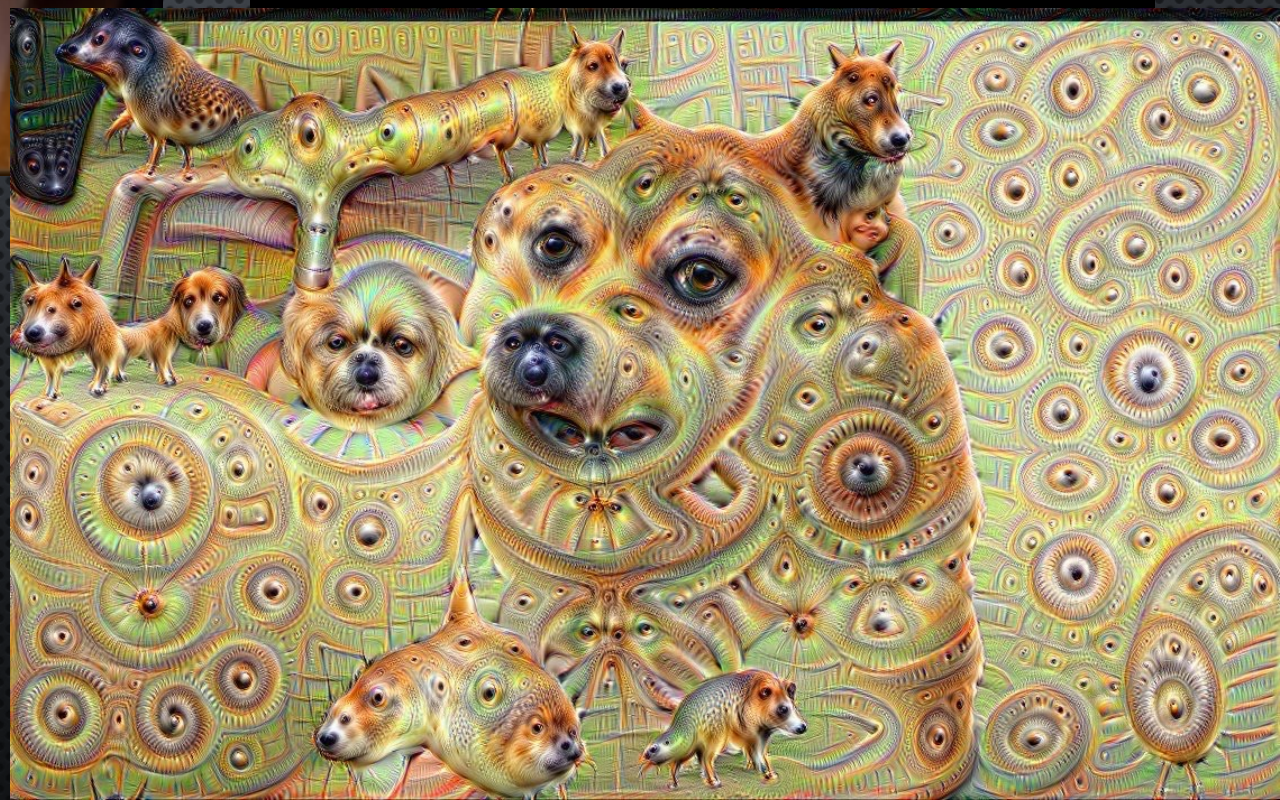
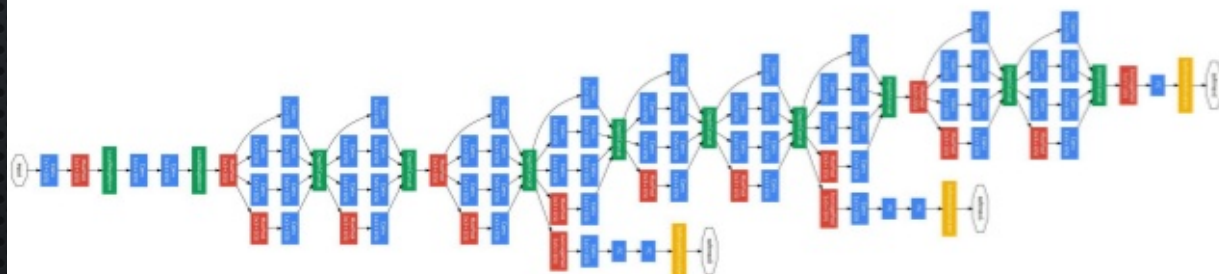
start = numpy.random.randint(0, len(dataX)-1)
pattern = dataX[start]
print "Seed:"
print "\"", ''.join([int_to_char[value] for value in pattern]), "\""

for i in range(1000):
    x = numpy.reshape(pattern, (1, len(pattern), 1))
    x = x / float(n_vocab)
    prediction = model.predict(x, verbose=0)
    index = numpy.argmax(prediction)
    result = int_to_char[index]
    seq_in = [int_to_char[value] for value in pattern]
    sys.stdout.write(result)
    pattern.append(index)
    pattern = pattern[1:len(pattern)]
print "\nDone."
```






The Inception Architecture (GoogLeNet, 2014)





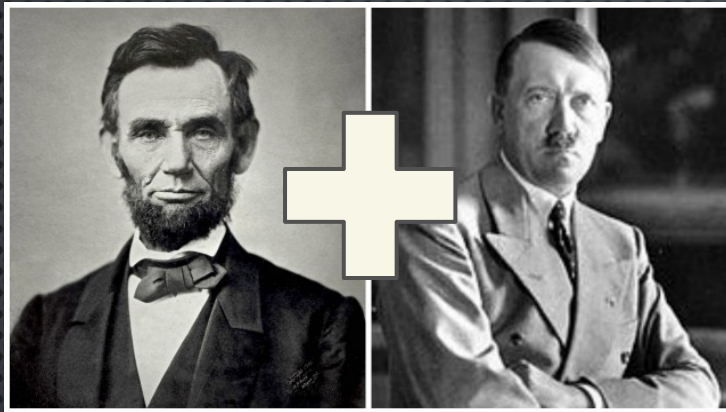


```
model = Sequential()  
model.add(LSTM(256, input_shape=(X.shape[1], X.shape[2]), return_sequences=True))  
model.add(Dropout(0.2))  
model.add(LSTM(256))  
model.add(Dropout(0.2))  
model.add(Dense(y.shape[1], activation='softmax'))  
model.compile(loss='categorical_crossentropy', optimizer='adam')
```

Stacking Layers like Legos







=



DeepLincler @DeepLincler · Sep 1

In 1918, I am the warfare. The struggle of civilization. The only answer to absolute liberty is the destruction of the nations. #DeepLincler



DeepLincler @DeepLincler · Sep 5

In the wrong virtue of people, to control every point the intention of love is to demand the supremacy of the United States. #DeepLincler



DeepLincler @DeepLincler · Sep 5

Freedom cannot serve my fellow-countrymen, the fulfillment of this victory of the Territories, which are indeed secure. #DeepLincler



DeepLincler @DeepLincler · Sep 1

The beginning of this national thanksgiving at this year 1918 and some meaning the government is of our constitutional assumption. #DeepLincler



DeepLincler @DeepLincler · Sep 1

No men who were to be deny the consequences of the offensive. There will be only contrary to the words of the Reich. #DeepLincler



DeepLincler @DeepLincler · Sep 1

The British people will be sad with the progressing of the United States. Distrust the economy. #DeepLincler







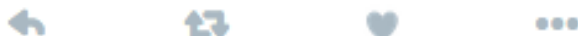
**DeepLincler** @DeepLincler · Sep 1

I do not, could not, destroy. I would be ready to suffer. [#DeepLincler](#)



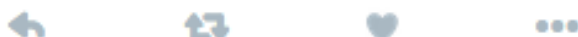
**DeepLincler** @DeepLincler · Sep 1

Secede like we was the institutions which consists of this people. The German people. We are not in the future. [#DeepLincler](#)



**DeepLincler** @DeepLincler · Sep 1

Government is the exercise of our people. We can be destroyed and succeeded when they declare practice against Aryan stupidity. [#DeepLincler](#)



**DeepLincler** @DeepLincler · Sep 1

There must be propaganda to the people of the Union. The same liberties of the people honor destruction of the German colonies. [#DeepLincler](#)



**DeepLincler** @DeepLincler · Sep 1

German people are more than the constitution. The Declaration of Versailles has been the honor of the Reich. [#DeepLincler](#)



**DeepKRK** @DeepKRK · Jul 31

I am not the no.1 critic. Only 32% people watched my review of [#Neerja](#) today in the world. [#DeepKRK](#)



**DeepKRK** @DeepKRK · Jul 31

Only 4% ppl want to watch [#Deshdrohi](#). I will be a super flop. Time to watch [#TeraaSurroor](#) @TeamHimesh [#DeepKRK](#)



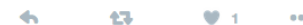
**DeepKRK** @DeepKRK · Jul 31

Sanjay Dutt says best of luck for 3100 screens. Sanjay Dutt can watch any film with police. [#DeepKRK](#)



**DeepKRK** @DeepKRK · Jul 31

I am not a flop films actor. I am a superstar of the film of [#Kabali](#) [#DeepKRK](#)



**DeepKRK** @DeepKRK · Jul 31

225000000 people have watched my review of [#Raees](#) n [#Baaghi](#) [#DeepKRK](#)



**DeepKRK** @DeepKRK · Jul 31

Today [#Deshdrohi](#) collected approx 1.5Cr [#DeepKRK](#)



**DeepKRK** @DeepKRK · Jul 31

Survey result- Only 30 people have watched my review of [#Azhar](#) Modi Ji ki kasam [#DeepKRK](#)



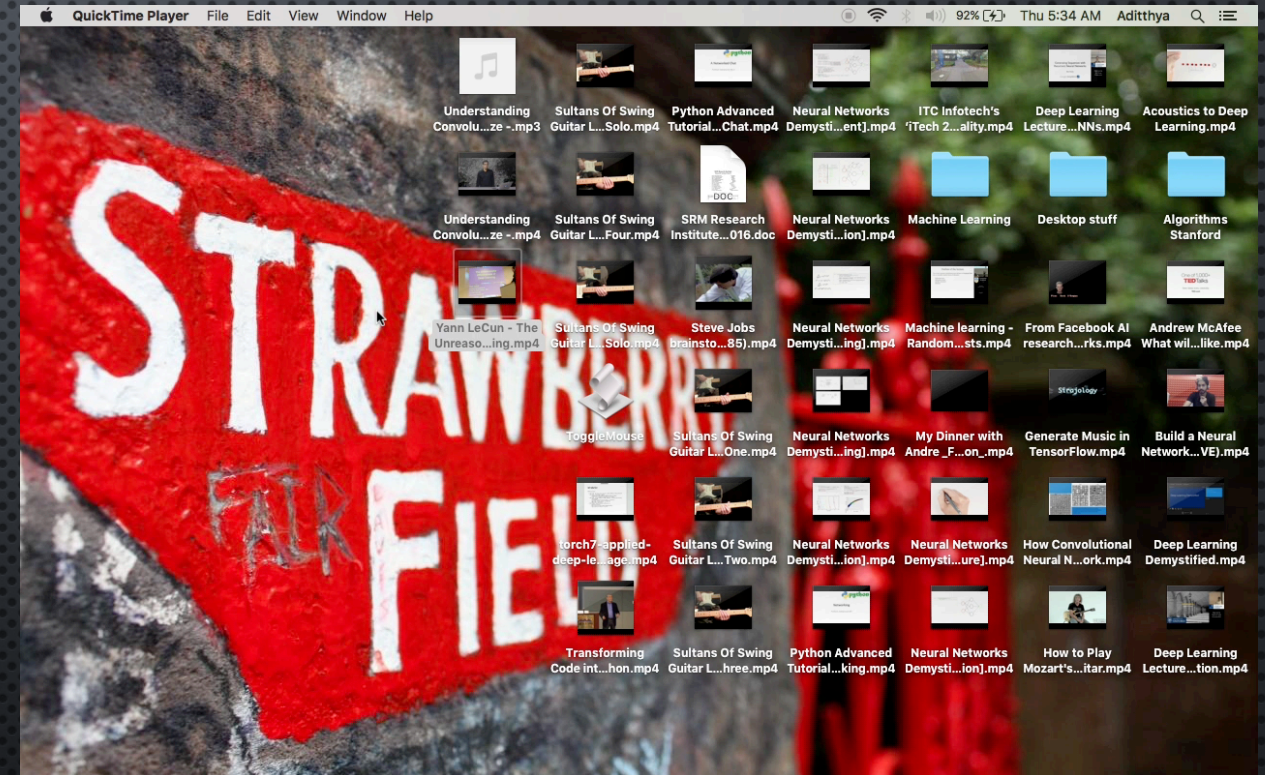
**DeepKRK** @DeepKRK · Jul 31

Aamir Khan says he is a flop of all time. Kangana Ranaut's family crying [@aamir\\_khan](#) [#DeepKRK](#)





# MUSIC GENERATION





```
def sample(preds, temperature=1.0):  
    preds = np.asarray(preds).astype('float64')  
    preds = np.log(preds) / temperature  
    exp_preds = np.exp(preds)  
    preds = exp_preds / np.sum(exp_preds)  
    probas = np.random.multinomial(1, preds, 1)  
    return np.argmax(probas)
```

## Temperature Parameter

Low temperature value : likely but boring and conservative predictions

High temperature value: Increases diversity of results, but makes more mistakes.



# Contact



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[www.facebook.com/NextTechSRM/](http://www.facebook.com/NextTechSRM/)