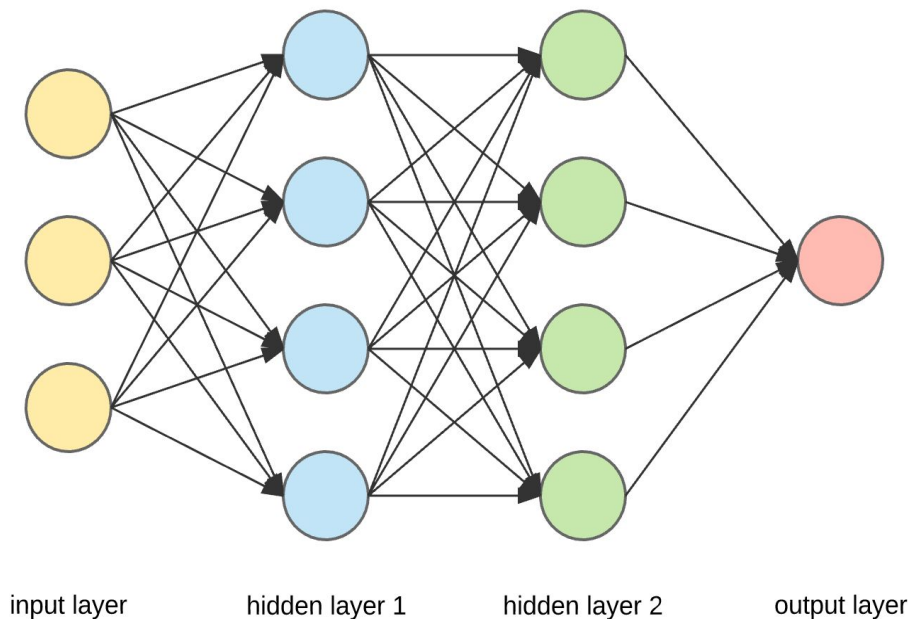# Generative Models

Redes Neurais

- Método de aprendizado de

  máquina

- "Inspirado" no cérebro humano
- Relativamente antigo
- Ganhando popularidade
- Consegue aproximar qualquer

  função

input layer   hidden layer 1   hidden layer 2   output layer

Tipos comuns de camadas

- Densas
- Convolucionais
- Recorrentes

Generative Models

- Capturam a probabilidade conjunta P(X, Y) ou se não houver rótulos P(X)
- Em contraste um modelo discriminativo captura a probabilidade condicional P(Y | X)
- Mais informalmente: Modelos que conseguem gerar novas instâncias de dados

Poesia e Prosa

Redes Recorrentes

- Criadas para reconhecer padrões em sequências de dados
  - Textos
  - Aúdios
  - Mercado financeiro
  - Vídeos
  - etc
- Usam neurônios com retroalimentação
  - Ou seja, o resultado do input i - 1, faz parte do input i
  - Podemos ver isso como sendo uma rede com memória
  - Isso nos permite ter uma noção de tempo ou de dados sequenciais
- Dizemos que é um modelo profundo no tempo e não no espaço

Geração de texto: A nível de caractere

- Podemos criar uma rede recorrente que tenta prever o próximo caractere num texto
- Então usamos a própria previsão como entrada para a rede
  - Mais simples
  - Menor número de possíveis saídas (no máximo 256)
  - Não gera textos tão reais

```
PANDARUS:
Alas, I think he shall be come approached and the day
When little srain 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 nues 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.
```

Fonte: karpathy.io

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.]]

Fonte: karpathy.io

Proof. Omitted. □

Lemma 0.1. *Let C be a set of the construction.*

Let C be a gerber covering. Let $\mathcal{F}$ be a quasi-coherent sheaves of $\mathcal{O}$-modules. We have to show that

$$\mathcal{O}_{\mathcal{O}_X} = \mathcal{O}_X(\mathcal{L})$$

.

Proof. This is an algebraic space with the composition of sheaves $\mathcal{F}$ on $X_{\text{étale}}$ we have

$$\mathcal{O}_X(\mathcal{F}) = \{morph_1 \times_{\mathcal{O}_X} (\mathcal{G}, \mathcal{F})\}$$

where $\mathcal{G}$ defines an isomorphism $\mathcal{F} \to \mathcal{F}$ of $\mathcal{O}$-modules. □

Lemma 0.2. *This is an integer $\mathcal{Z}$ is injective.*

Proof. See Spaces, Lemma ??. □

Lemma 0.3. *Let S be a scheme. Let X be a scheme and X is an affine open covering. Let $\mathcal{U} \subset \mathcal{X}$ be a canonical and locally of finite type. Let X be a scheme. Let X be a scheme which is equal to the formal complex.*

The following to the construction of the lemma follows.

Let X be a scheme. Let X be a scheme covering. Let

$$b : X \to Y' \to Y \to Y \to Y' \times_X Y \to X.$$

be a morphism of algebraic spaces over S and Y.

Proof. Let X be a nonzero scheme of X. Let X be an algebraic space. Let $\mathcal{F}$ be a quasi-coherent sheaf of $\mathcal{O}_X$-modules. The following are equivalent

(1) $\mathcal{F}$ is an algebraic space over S.
(2) If X is an affine open covering.

Consider a common structure on X and X the functor $\mathcal{O}_X(U)$ which is locally of finite type. □

This since $\mathcal{F} \in \mathcal{F}$ and $x \in \mathcal{G}$ the diagram
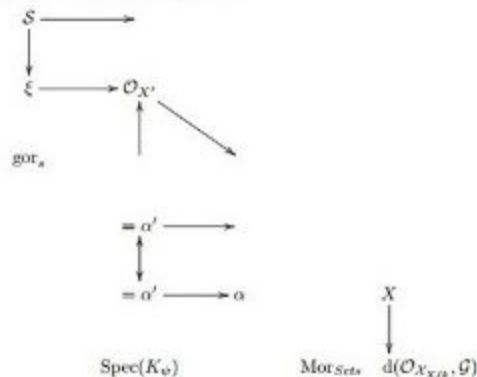
is a limit. Then $\mathcal{G}$ is a finite type and assume S is a flat and $\mathcal{F}$ and $\mathcal{G}$ is a finite type $f_\bullet$. This is of finite type diagrams, and

- the composition of $\mathcal{G}$ is a regular sequence,
- $\mathcal{O}_{X'}$ is a sheaf of rings. □

Proof. We have see that $X = \text{Spec}(R)$ and $\mathcal{F}$ is a finite type representable by algebraic space. The property $\mathcal{F}$ is a finite morphism of algebraic stacks. Then the cohomology of X is an open neighbourhood of U. □

Proof. This is clear that $\mathcal{G}$ is a finite presentation, see Lemmas ??.
A *reduced above* we conclude that U is an open covering of C. The functor $\mathcal{F}$ is a "field

$$\mathcal{O}_{X,x} \longrightarrow \mathcal{F}_{\overline{x}} \quad -1(\mathcal{O}_{X_{\text{étale}}}) \longrightarrow \mathcal{O}_{X_x}^{-1}\mathcal{O}_{X_\lambda}(\mathcal{O}_{X_V}^{\overline{x}})$$

is an isomorphism of covering of $\mathcal{O}_{X_i}$. If $\mathcal{F}$ is the unique element of $\mathcal{F}$ such that X is an isomorphism.
The property $\mathcal{F}$ is a disjoint union of Proposition ?? and we can filtered set of presentations of a scheme $\mathcal{O}_X$-algebra with $\mathcal{F}$ are opens of finite type over S. If $\mathcal{F}$ is a scheme theoretic image points. □

If $\mathcal{F}$ is a finite direct sum $\mathcal{O}_{X_\lambda}$ is a closed immersion, see Lemma ??. This is a sequence of $\mathcal{F}$ is a similar morphism.

Geração de texto: A nível de palavra

- Podemos criar uma rede recorrente que tenta prever a próxima palavra num texto
- Então usamos a própria previsão como entrada para a rede
  - Mais entradas possíveis
  - Mais saídas possíveis
  - Gera textos mais realistas (pelo menos as palavras todas fazem sentido)

Geração de texto: A nível de palavra

when he said that a man when he grows old may learn many things for he can no more learn much than he can run much youth is the time for any extraordinary toil of course and therefore calculation and geometry and all the other elements of instruction which are a preparation for dialectic should be presented to the name of idle spendthrifts of whom the other is the manifold and the unjust and is the best and the other which delighted to be the opening of the soul of the soul and the embroiderer will have to be said at

Attention, Transformers e Muppets

Bert

GPT-2

Exemplo de Texto

Prompt: In a shocking finding, scientist discovered a herd of unicorns living in a remote, previously unexplored valley, in the Andes Mountains. Even more surprising to the researchers was the fact that the unicorns spoke perfect English.

Texto gerado:
The scientist named the population, after their distinctive horn, Ovid's Unicorn. These four-horned, silver-white unicorns were previously unknown to science.
Now, after almost two centuries, the mystery of what sparked this odd phenomenon is finally solved.
Dr. Jorge Pérez, an evolutionary biologist from the University of La Paz, and several companions, were exploring the Andes Mountains when they found a small valley, with no other animals or humans. Pérez noticed that the valley had what appeared to be a natural fountain, surrounded by two peaks of rock and silver snow.
Pérez and the others then ventured further into the valley. "By the time we reached the top of one peak, the water looked blue, with some crystals on top," said Pérez.

Música

WaveNet

Doodle

Geração de Imagens

Redes Adversariais

Primeira GAN

Big GAN

Style GAN

GauGAN

Pinturas e Esbocos

Sketch RNN

Spiral e Spiral++

Impactos na Sociedade

Fake News

Deep Fake

Arte: Helera Sarin

Arte: Quasimodo