ТЕХНОСФЕРА

Лекция №12

Введение в машинное обучение

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Нейронные сети. Лекция 12

Содержание лекции

Что дальше?

1. Deep Metric learning

2. Рекуррентные нейронные сети

3. Обучение с подкреплением

4. …

Deep Metric Learning

1. При решении задач компьютерного зрения достаточно редки ситуации, когда имеется много изображений, характеризующих каждый интересующий класс объектов

2. Чаще всего имеется достаточно сильная несбалансированность классов
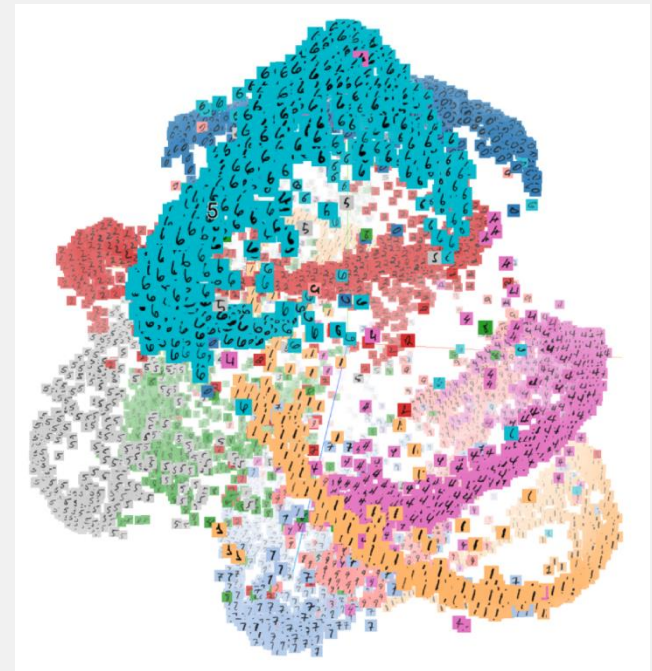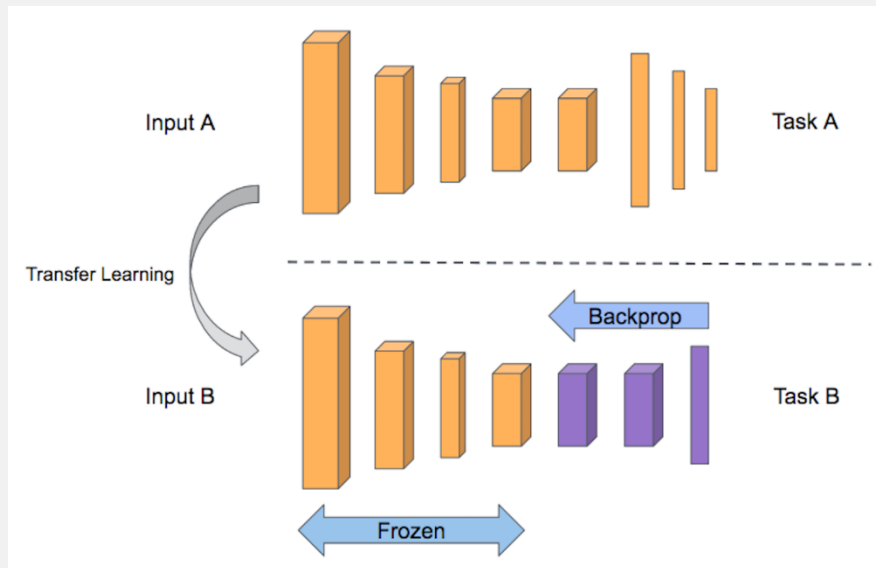
Deep Metric Learning

1. Создание модели, хорошо описывающей изображения

2. Обучение модели таким образом, чтобы сохранялась «близость» между embedding'ами изображений, имеющих семантическое сходство

3. Возможность использовать полученную модель для предсказания классов, которые не были представлены в обучающей выборке

Deep Metric Learning

Deep Metric Learning

1. Имеется некоторое отображение для изображений в embedding'и
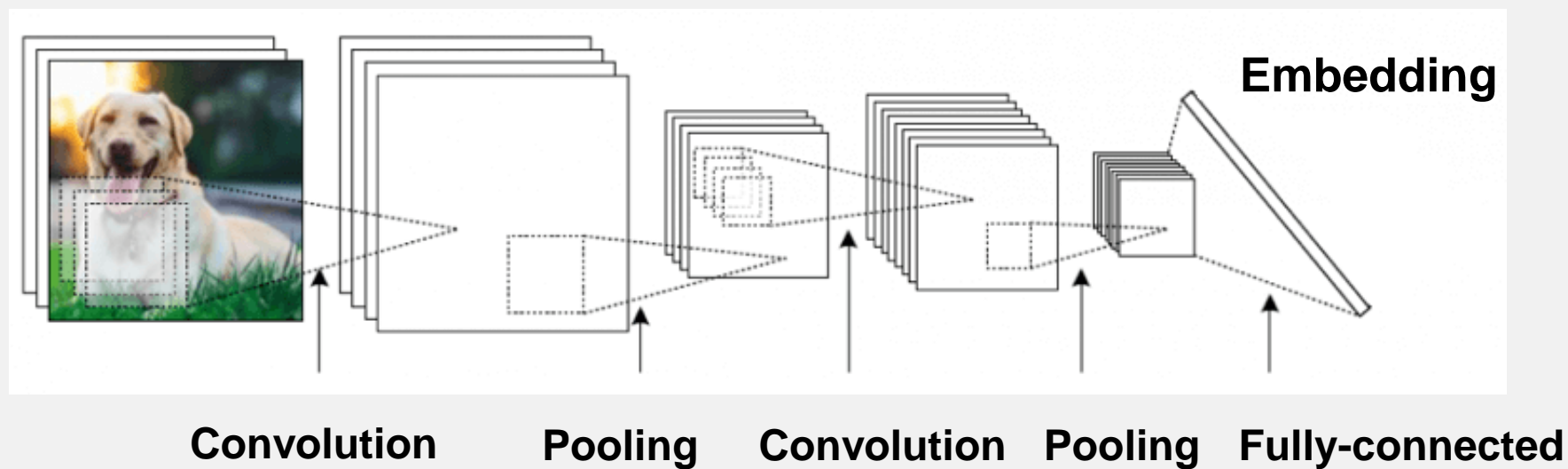
$$f(x_i): R^L \to R^D$$

2. Метрика схожести объектов

$$\phi(x_i, x_j) = distance\left(f(x_i), f(x_j)\right),$$

где $distance$ может быть евклидовым, косинусным расстоянием и т.д.

Deep Metric Learning

Получение embedding'ов

Convolution   **Pooling**   **Convolution**   **Pooling**   **Fully-connected**

Deep Metric Learning
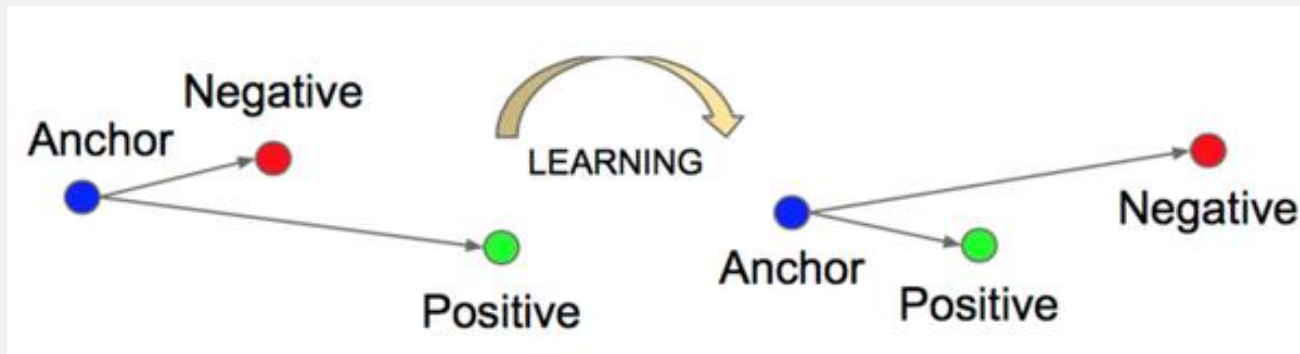
Triplet Loss

$$L(X, \Theta) = \frac{1}{2} \sum_{i=1}^{m} \max\left(0, \left\| f(x_i^a) - f(x_i^p) \right\|_2^2 - \left\| f(x_i^a) - f(x_i^n) \right\|_2^2 + \alpha\right)$$

Deep metric learning using triplet network,
Elad Hoffer, Nir Ailon

Deep Metric Learning

Triplet Loss

Deep Metric Learning
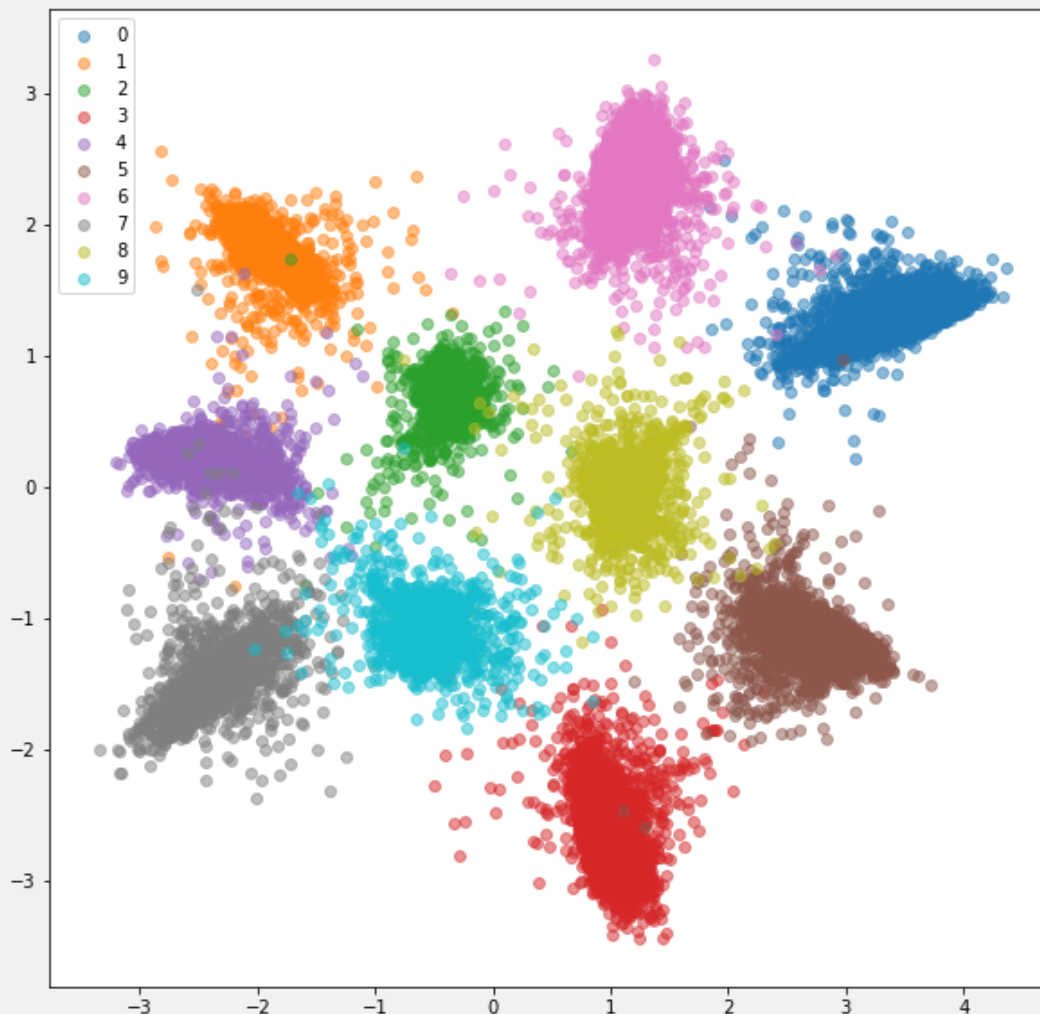
Нейронные сети. DSSM
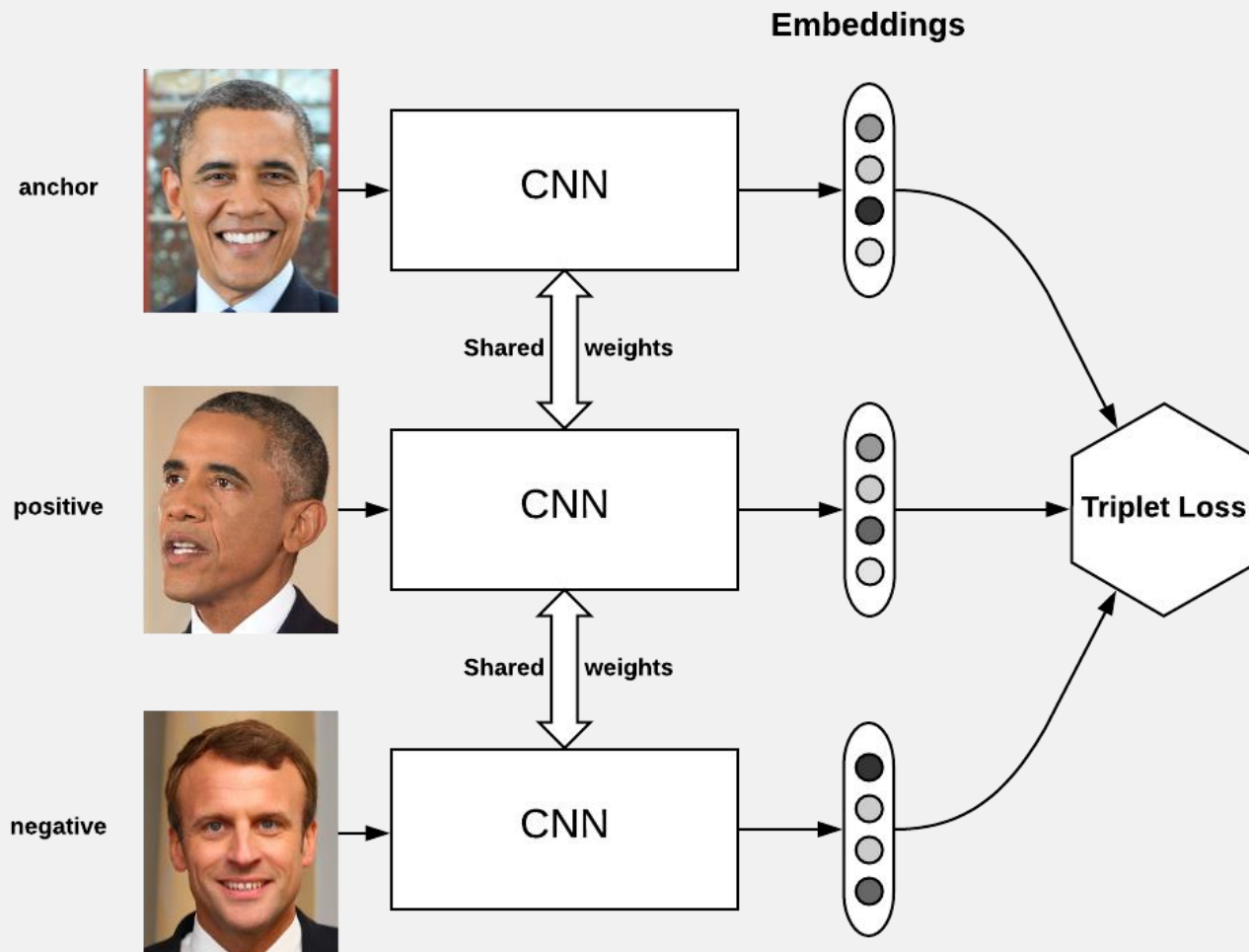
Deep Semantic Similarity Model

Рекуррентные нейронные сети
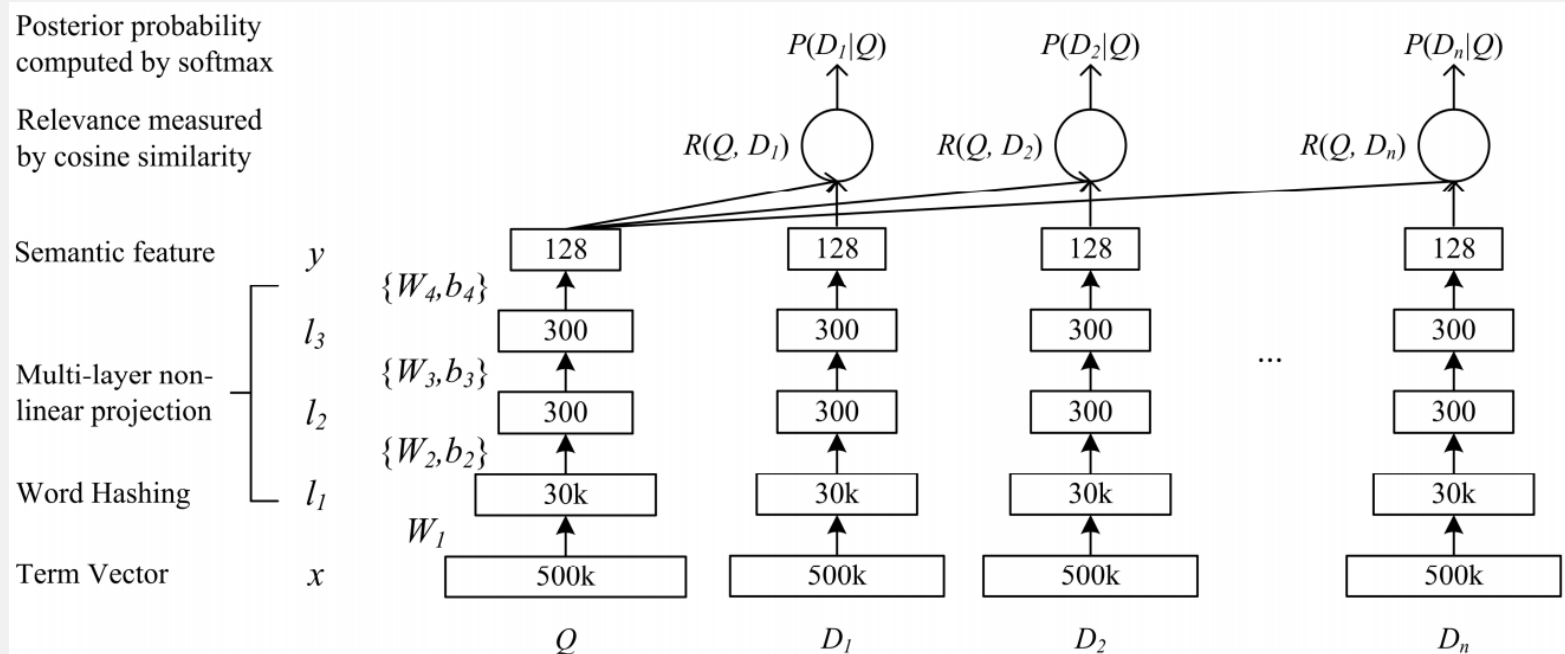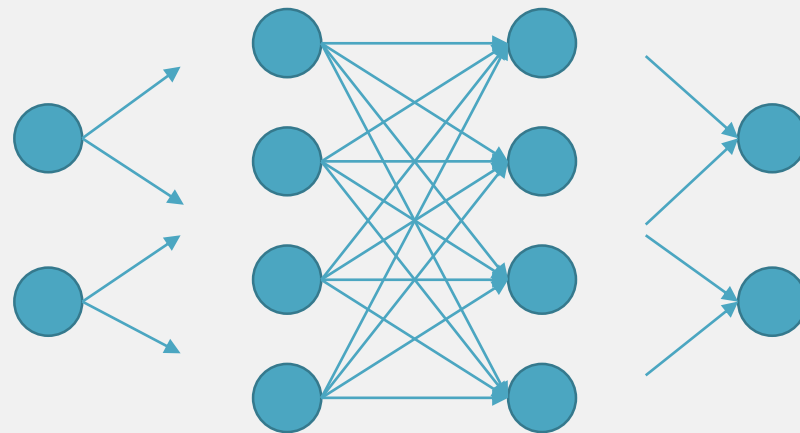
Feedforward neural network

Сети прямого распространения:
- аппроксимируют любую функцию

Рекуррентные нейронные сети
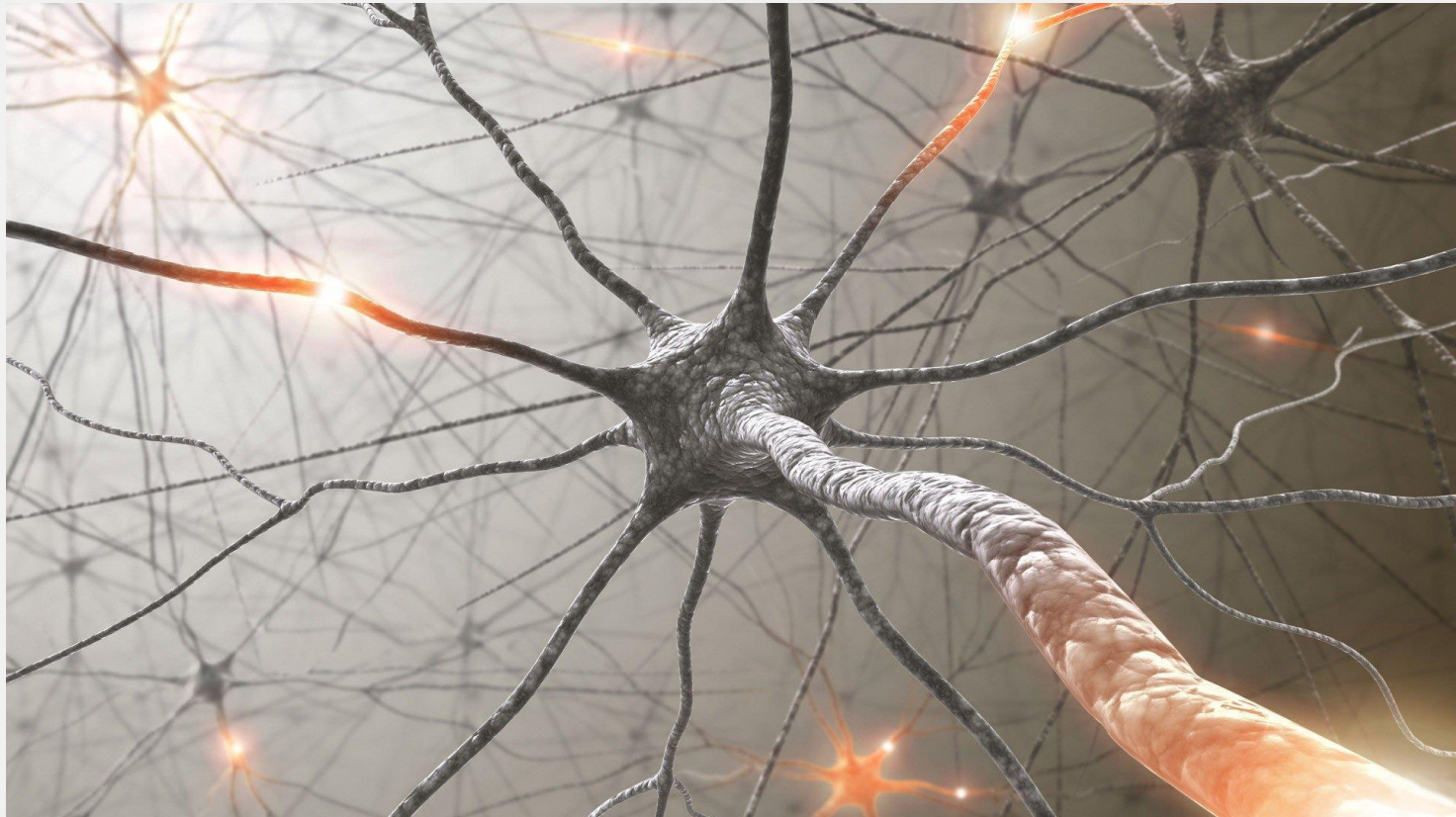
Все биологические сети рекуррентные

Рекуррентные нейронные сети

Recurrent neural network

Рекуррентные нейронные сети:
* моделируют динамическую систему

Рекуррентные нейронные сети

Backpropagation through time

RNN с задержкой на скрытом слое

Backpropagation through time

unfolding over time

Рекуррентные нейронные сети

Long Short Temp Memory

Рекуррентные нейронные сети. Пример

IMDb
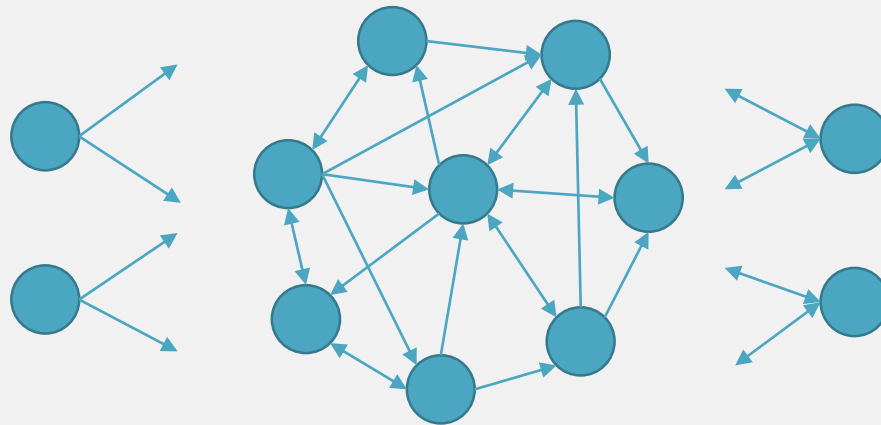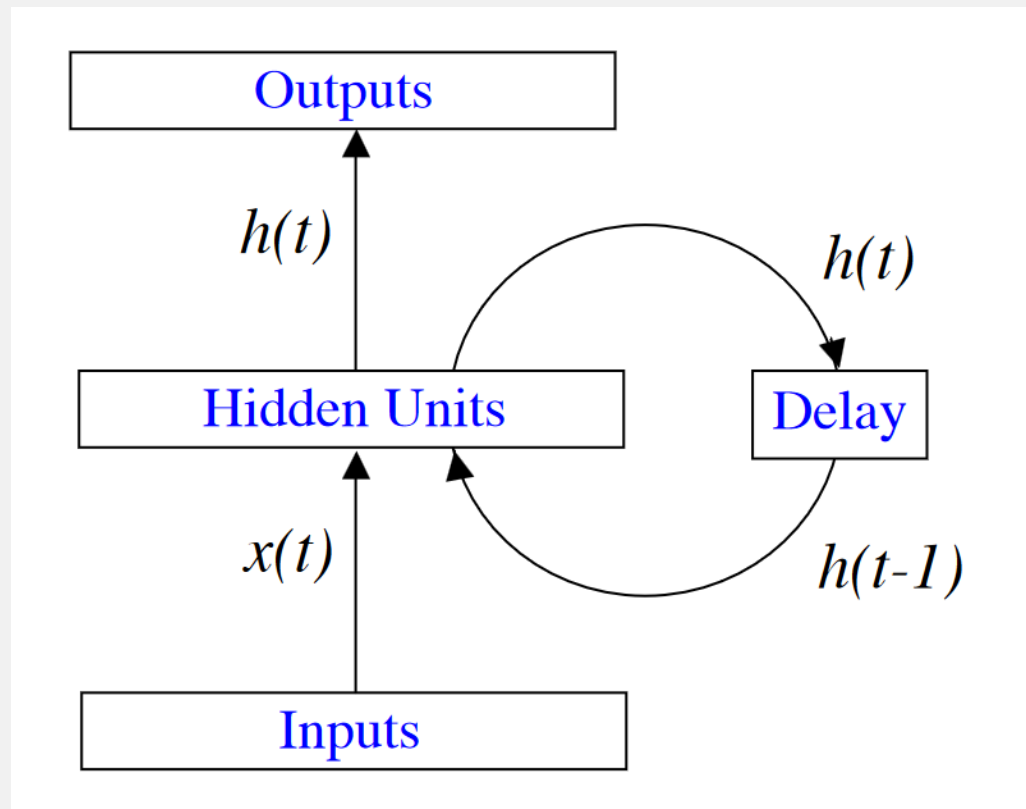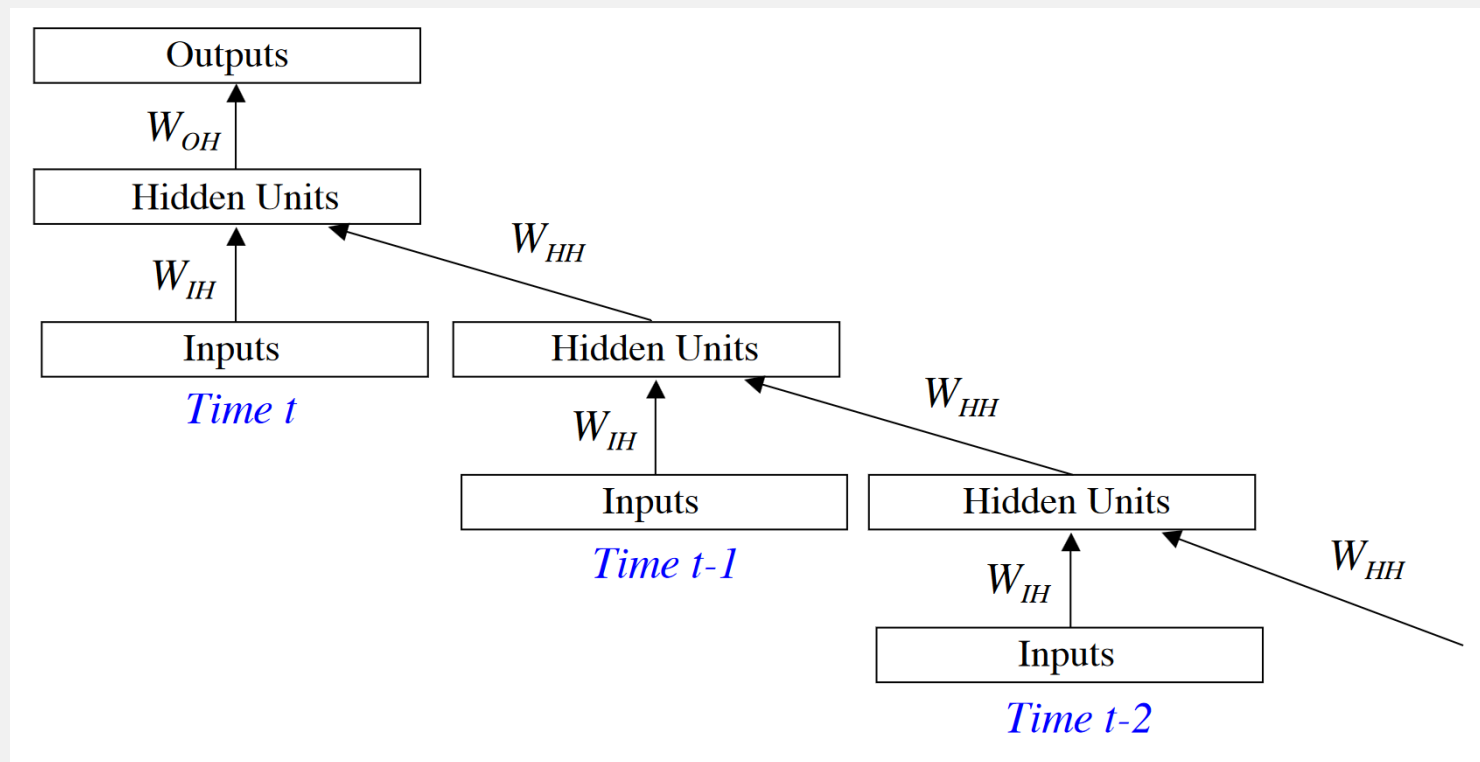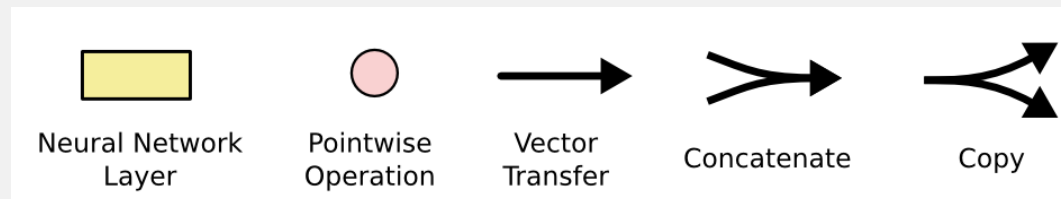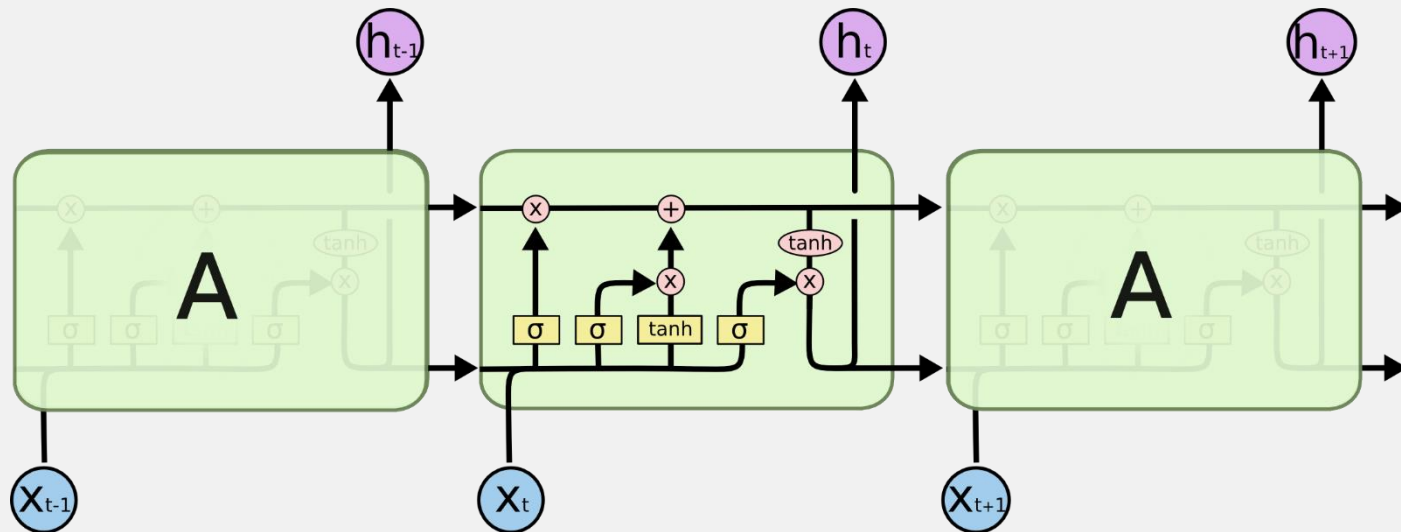
User Reviews

★★★★★★★★★★ **When you're tired of the Marvel formula!**
9 October 2018 | by dhdregun – See all my reviews

Venom isn't a Marvel movie, for that it succeeds far more than if it had been. If you're getting tired of the Marvel formula then Venom is going to be a breath of fresh symbiotic air.

Venom occupies it's own universe, it's dark, gritty and more grown up compared to its counterparts. The existence of Eddie's personal life feels real, his struggles are far more relatable than any other character portrayed in a comic book movie so far. He is an everyday guy who screws up and because of that his need to redeem himself gets him attached to a symbiote. After that hes just trying to stay alive until the very end when the truth of his circumstance means he is the only one who can prevent humanities destruction. The movie didnt lead up to this, it wasnt even known what was to come until the last 20 minutes of the movie.

This is a marriage of two separate movies and it's done very well. You remove Venom and the movie feels like it could stand on it's own with a few key changes. The Venom portion hits all the notes required for a superhero movie.

You actually care about Eddy and it's not because they give some sappy back story about loss or self reflection. You care because you can actually relate with what happens to him and how you may have reacted in the same scenario. He wasnt rich, a god or born with powers, didnt live with super advanced technology or volunteer for an experiment. Hes just a guy with a 9-5 in a regular relationship and living in the same world where shake downs and homelessness exist.

The critics wanted a different movie then what they got. They wanted a basic Marvel super hero movie without realizing one of the better super hero movies as of late (Logan) didnt follow that formula either.

Venom is the movie that stands on its own by creating a story with elements suited to the character, not checkboxes like others. Its entertaining and feels like it could have lasted longer. I'd rather feel left wanting then feeling like the movie is now requiring me to continue watching it because it's been dragged out too long.

I'd rather watch another Venom movie then any other marvel universe sequel at this point.

258 of 425 people found this review helpful. Was this review helpful to you? Yes No | Report this

Review this title | See all 2 702 user reviews »

User Reviews

★★★★★★★★★★ **An absolutely incredible film!**
2 May 2002 | by NRGWasp – See all my reviews

Simply incredible. Never before have I seen a 3 hour movie that didn't seem like 3 hours. I read the Lord of the Rings very recently and I was surprised at how similar Peter Jackson's vision was to my own.

Now about the omissions and alterations. I'm not a crazed fanatic who gets worked up over every little detail. I didn't mind Arwen's inflation and I'm actually glad Tom Bombadil was scrubbed (I felt Tom Bombadil was an unnecessary addition to the book). Despite these minor changes, the screenplay stays extremely close to the book and flows very very well (and the prologue was a nice touch).

The acting was flawless. As I've read many many times in other reviews, McKellen doesn't play Gandalf, he IS Gandalf. Wood, Mortensen, Holm, Astin, everyone was fantastic. My hat's off to Sean Bean who delivers an excellent performance as Boromir, a character who's intentions are good but wrestles with the corrupting power of the Ring. Bean portrays it VERY well. Oh, and Andy Serkis does a PERFECT Gollum voice. It's EXACTLY as I imagined it myself.

The special effects were incredible, the cave troll, the balrog, Gollum, and Sauron's Eye all looked amazing. I was also very impressed by the seamless shrinking of the vertically challenged characters.

What's wrong with this movie? I have no idea... I thought everything was perfect. MY biggest gripe is having to wait an entire year to see The Two Towers!

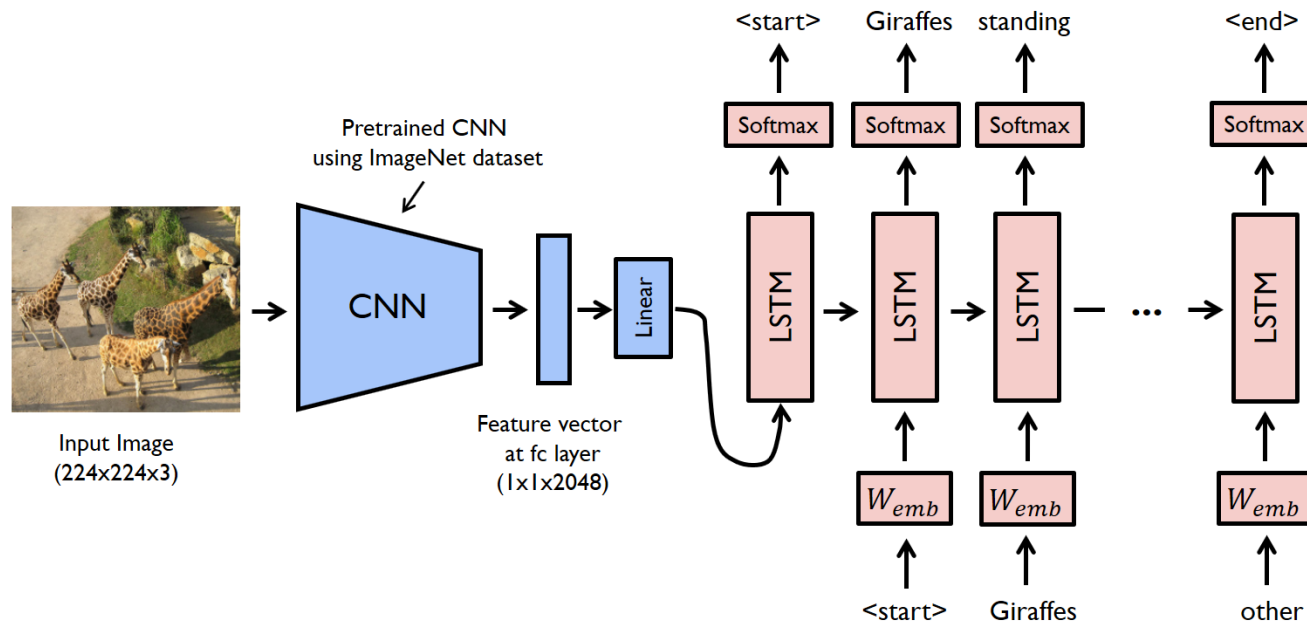29 of 30 people found this review helpful. Was this review helpful to you? Yes No | Report this

Review this title | See all 5 086 user reviews »

positive
↑
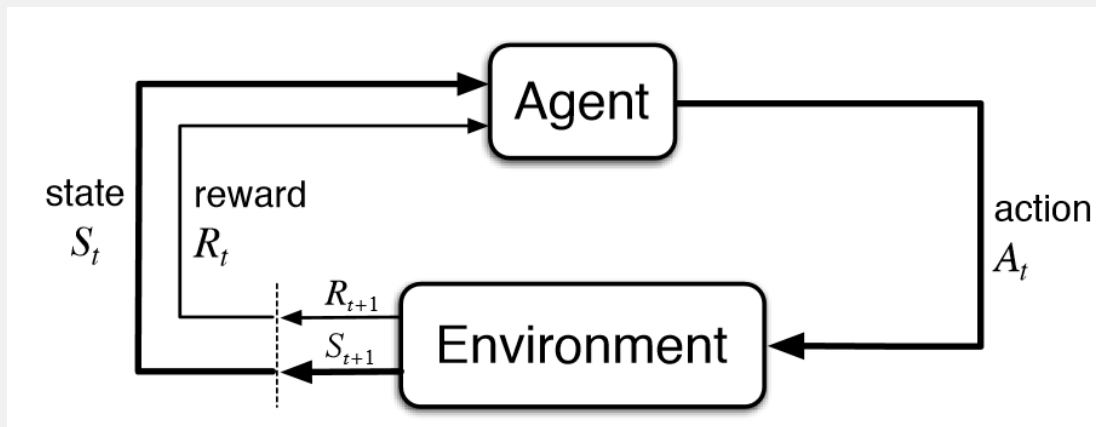Top layer
↑
LSTM
↑ ↑ ↑ ↑
Word embedding
↑ ↑ ↑ ↑
A good buy ! — One-hot vectors
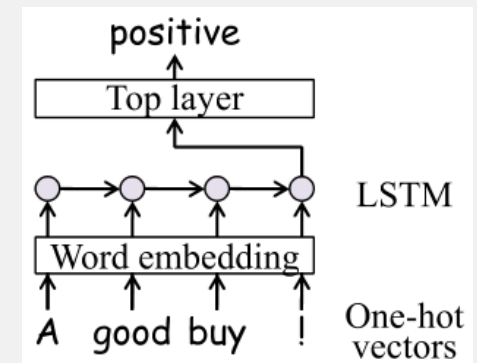
Рекуррентные нейронные сети. Пример

Image to text

Обучение с подкреплением

Agent

- Получает reward R_t
- Получает состояние S_t
- Совершает действие A_t

Environment

- Получает действие A_t
- Генерирует состояние S_{t+1}
- Генерирует reward R_{t+1}

Обучение с подкреплением

Примеры решаемых задач

Управление портфелем ценных бумаг

Игры
Шахматы
Победа +1
Поражение -1

Робототехника
Движение по траектории

Обучение с подкреплением

Награды (Rewards)

- R_t - скаляр

- Задача агента – максимизировать среднюю сумму полученных R_t

- Любая задача может быть сформулирована в виде максимизации суммы R_t

Состояние

В процессе взаимодействия со средой агент накапливает историю $H_t = R_1, O_1, A_1, \ldots, R_t, O_t, A_t$.
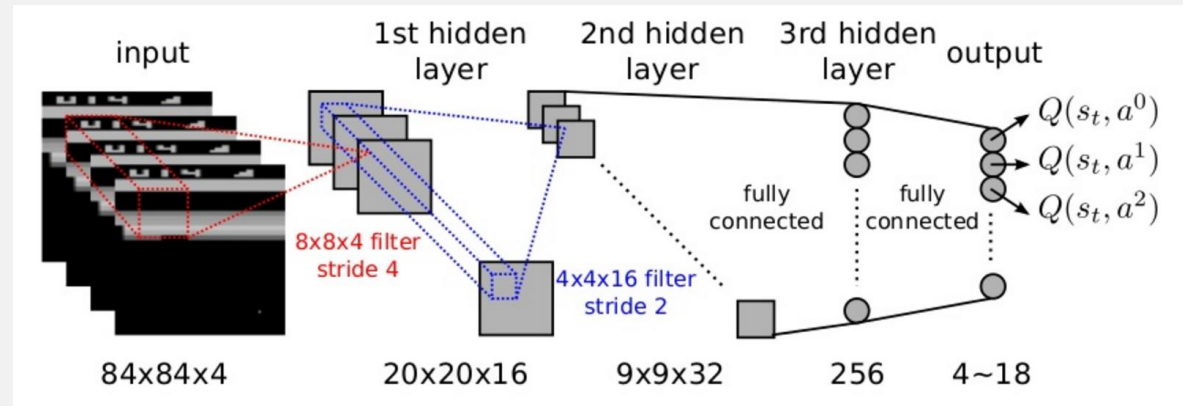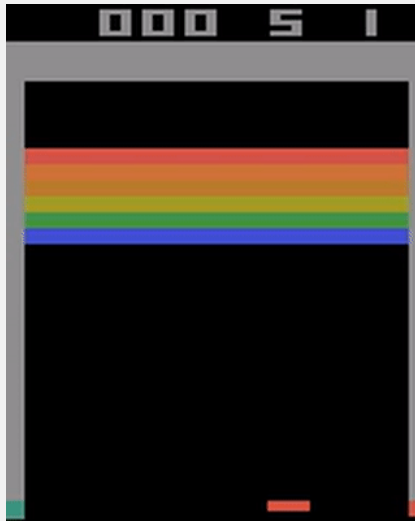
Для принятия решения хранение всей истории может быть крайне избыточно.

Игры: O_t - скриншот экрана

Робототехника: + информация со всех датчиков

Мы хотим иметь такое представление истории $S_t = f(H_t)$, которое было бы «достаточной статистикой» для будущего.

Обучение с подкреплением

input | 1st hidden layer | 2nd hidden layer | 3rd hidden layer | output

8x8x4 filter stride 4

4x4x16 filter stride 2

fully connected

fully connected

$Q(s_t, a^0)$
$Q(s_t, a^1)$
$Q(s_t, a^2)$

84x84x4   20x20x16   9x9x32   256   4~18

https://github.com/keras-rl/keras-rl

ТЕХНОСФЕРА

Спасибо за внимание!

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