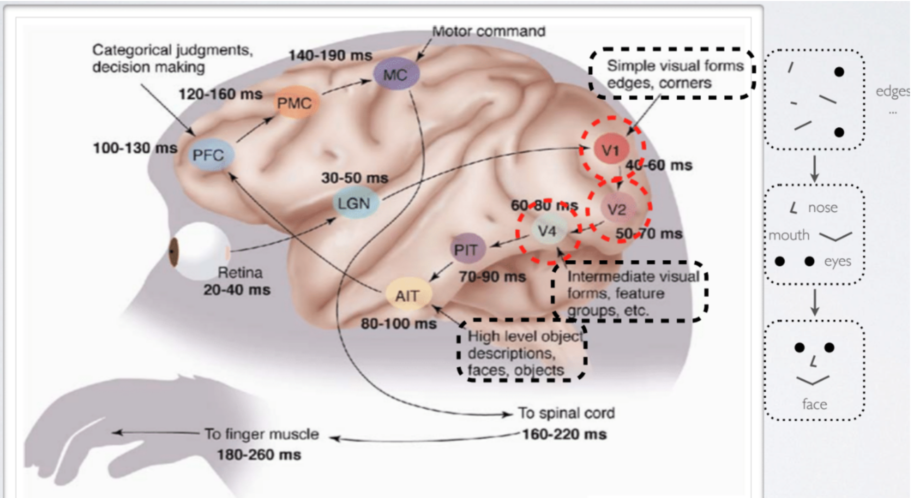
Le Réseau neuronal convolutif

Chaolei CAI

Paris VIII

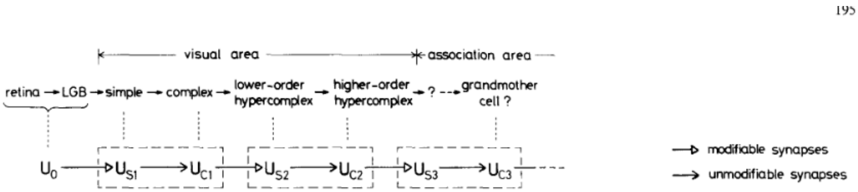
April 28, 2020

Le modèle vivant



[picture from Simon Thorpe]

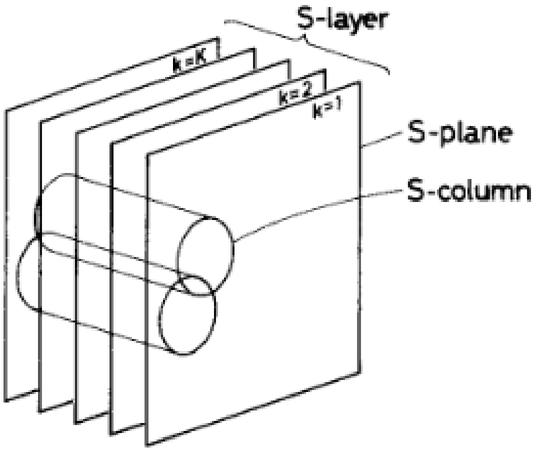
Correspondance avec le modèle de Hubel et Wiesel et le Néocognitron



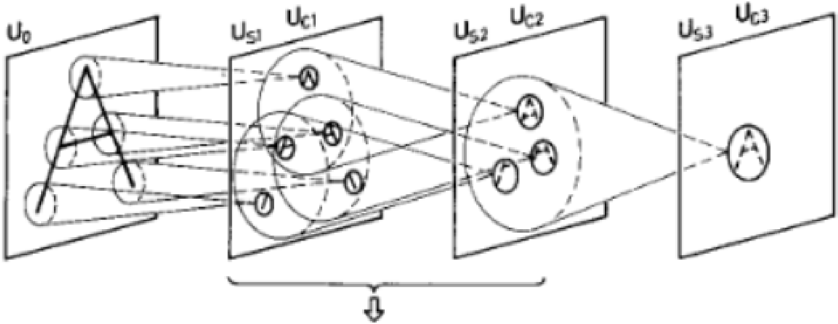
Formule de la sortie d'une cellule S

$$u_{Sl}(k_l, \mathbf{n}) = r_l \cdot \varphi\left[\frac{1 + \sum_{k_{l-1}=1}^{K_{l-1}} \sum_{\mathbf{v}\in S_l} a_l(k_{l-1}, \mathbf{v}, k_l) \cdot u_{Cl-1}(k_{l-1}, \mathbf{n}+\mathbf{v})}{1 + \frac{2r_l}{1+r_l} \cdot b_l(k_l) \cdot v_{Cl-1}(\mathbf{n})} - 1\right],$$

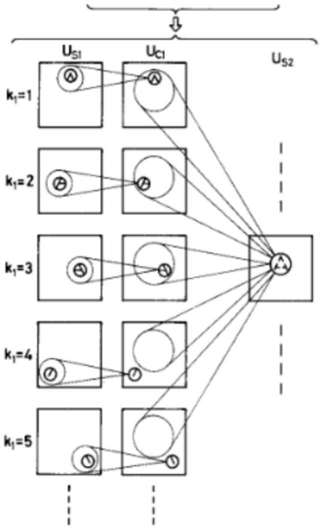
Auto-organisation du réseau



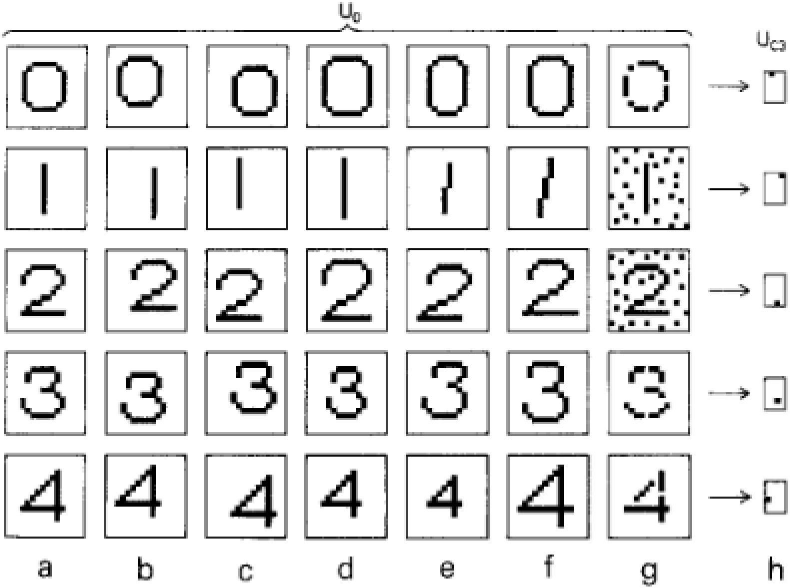
Auto-organisation du réseau



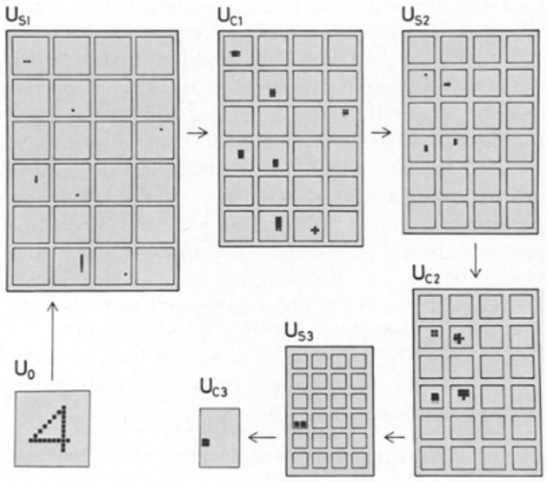
Auto-organisation du réseau



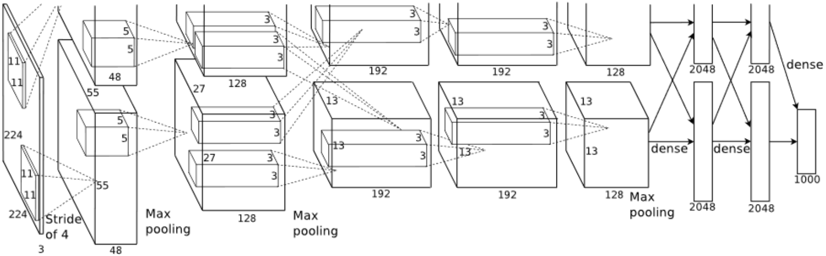
Exemple de detection numérique



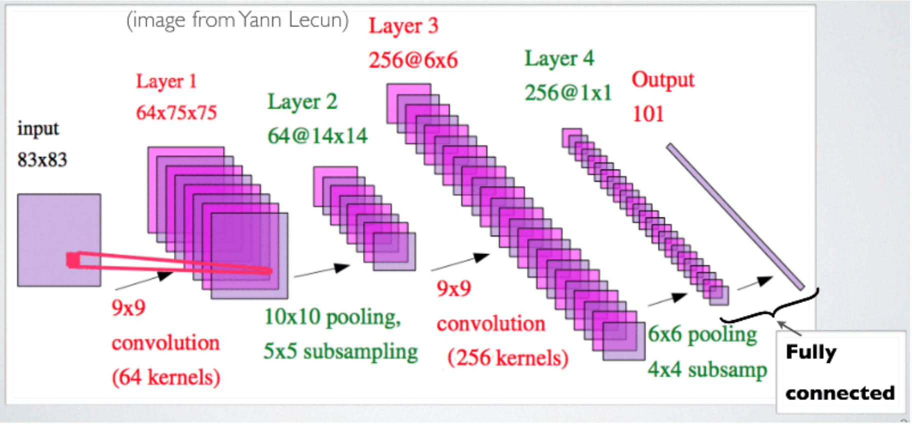
Exemple de detection numérique



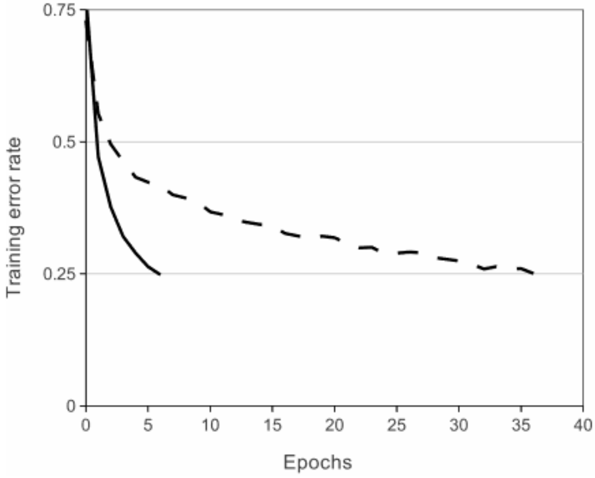
Architecture du réseau



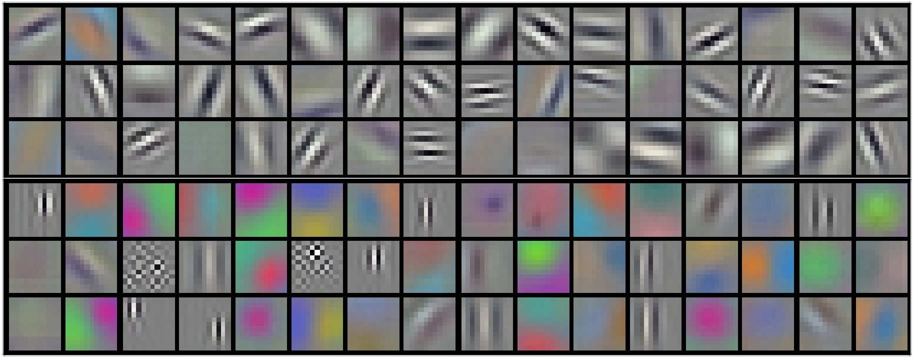
Architecture du réseau | modèle initial



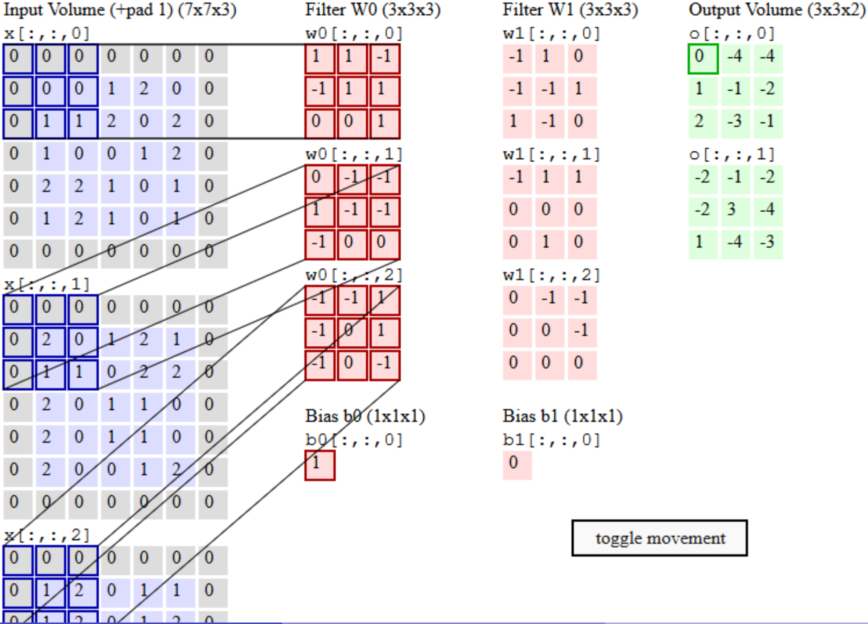
Rectified Linear Unites ReLUs



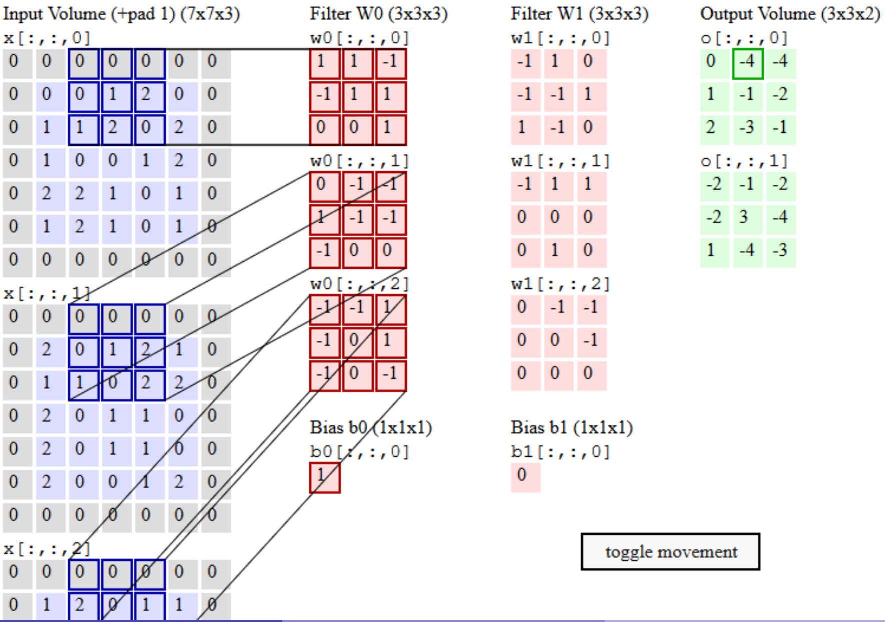
Couches de convolution



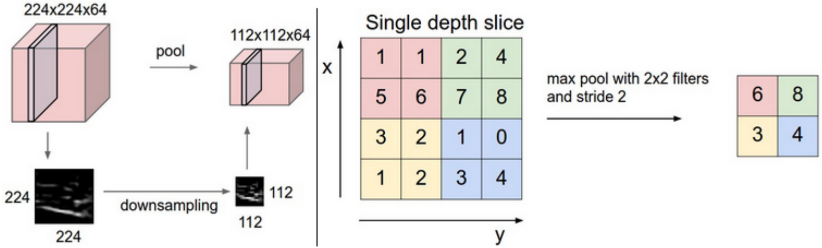
Produit de convolution



Produit de convolution

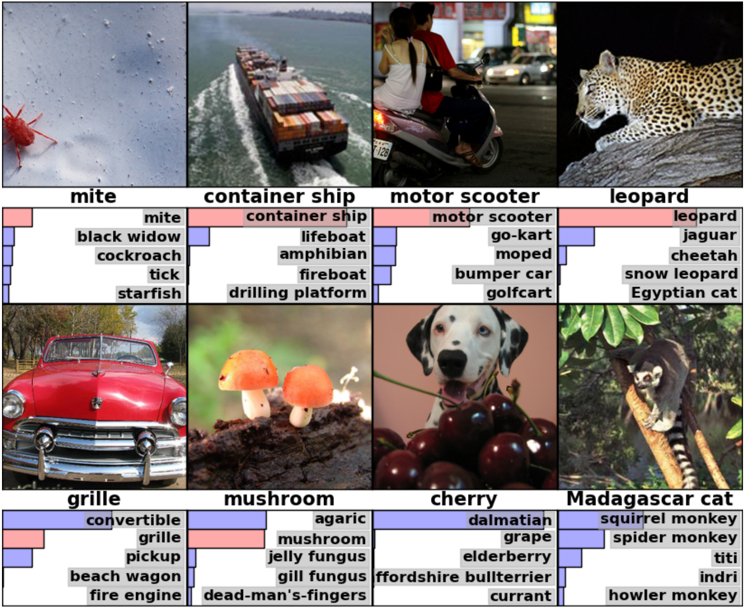


Couches de pooling

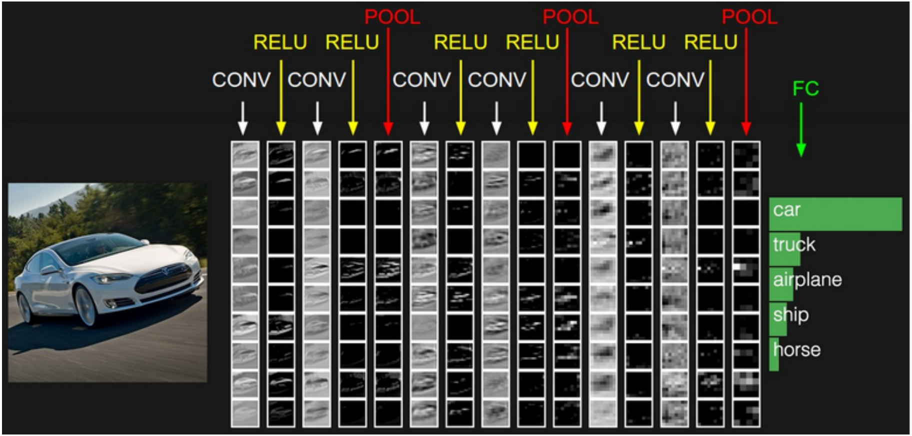


Pooling layer downsamples the volume spatially, independently in each depth slice of the input volume. **Left:** In this example, the input volume of size [224x224x64] is pooled with filter size 2, stride 2 into output volume of size [112x112x64]. Notice that the volume depth is preserved. **Right:** The most common downsampling operation is max, giving rise to **max pooling**, here shown with a stride of 2. That is, each max is taken over 4 numbers (little 2x2 square).

Présentation des résultats



Présentation des résultats



Et après. . .

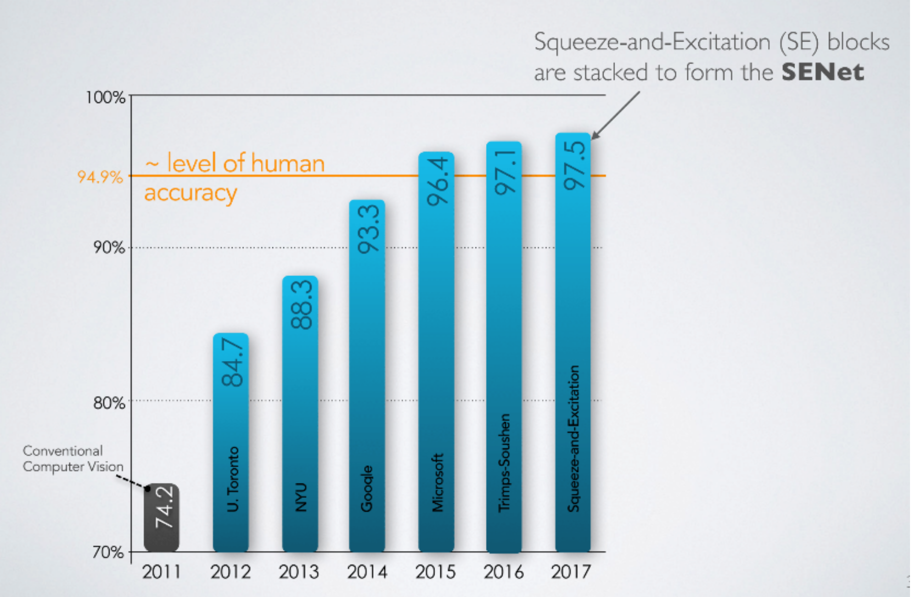

Squeeze-and-Excitation (SE) blocks
are stacked to form the **SENet**
100%
94.9%
~ level of human
accuracy
90%
80%
70%
Conventional
Computer Vision
74.2
84.7
U. Toronto
88.3
NYU
93.3
Google
96.4
Microsoft
97.1
Trimps-Soushen
97.5
Squeeze-and-Excitation
2011
2012
2013
2014
2015
2016
2017

Image initial

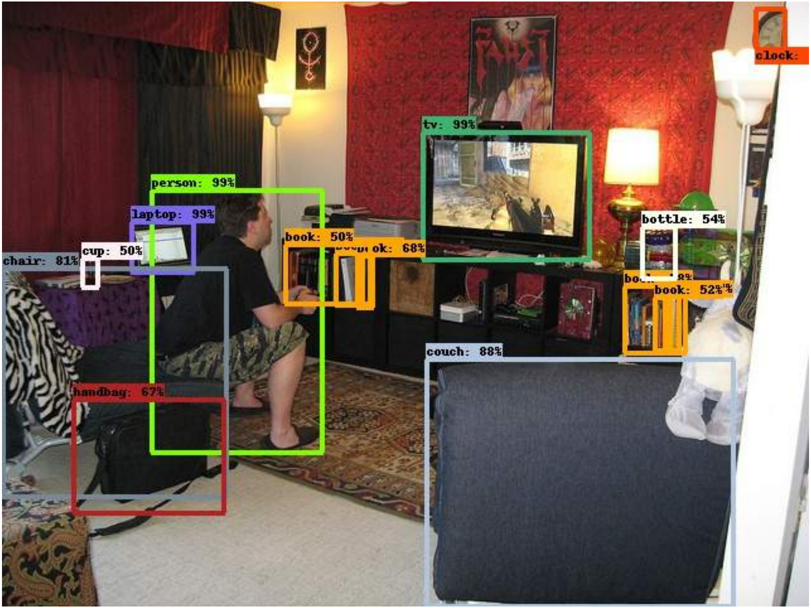


Image après transplant

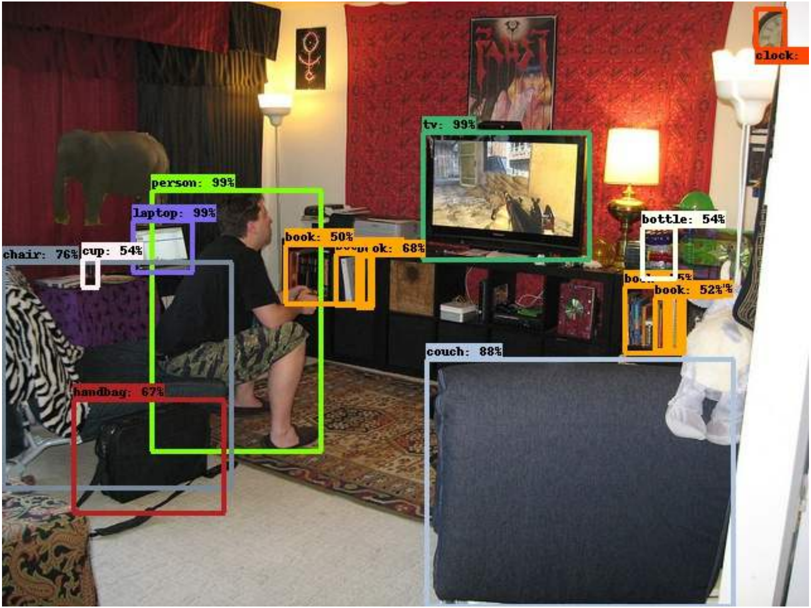


Image après transplant

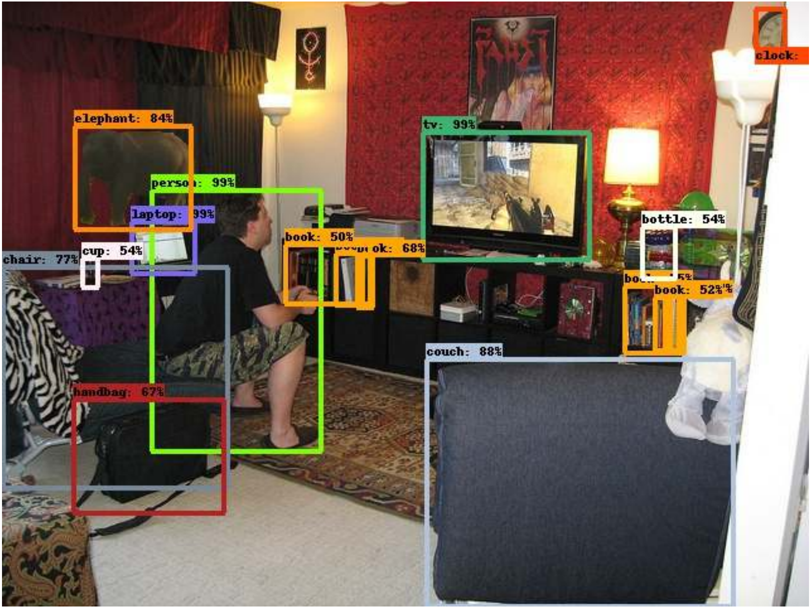


Image après transplant

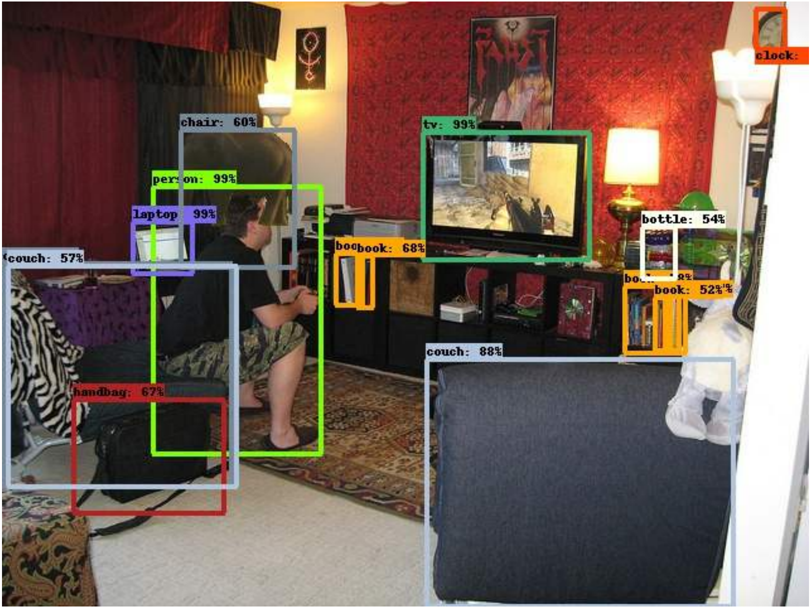


Image initial

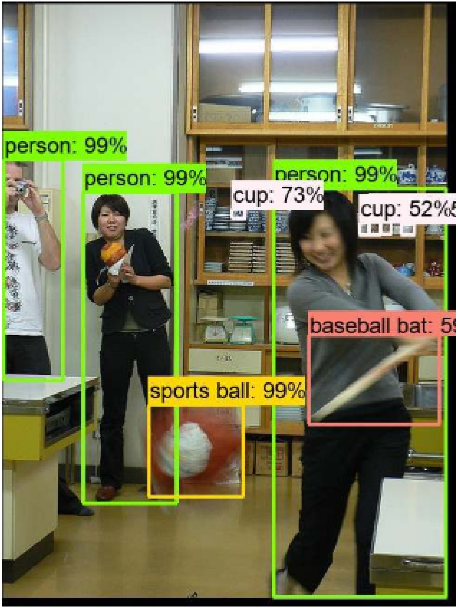


Image après transplant

Image après transplant

[2] [3] [4] [6] [7] [5] [1]

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