



Extended

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Deep Learning Foundation



Outline

1/ Demo of the project

2/ Classification

3/ Application



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Back propagation neural network

- 把每一层权重更新的初始步长设置为 0
 - 输入到隐藏层的权重更新是 $\Delta w_{ij} = 0$
 - 隐藏层到输出层的权重更新是 $\Delta W_j = 0$
- 对训练数据当中的每一个点
 - 让它正向通过网络, 计算输出 \hat{y}
 - 计算输出节点的误差梯度 $\delta^o = (y - \hat{y})f'(z)$ 这里 $z = \sum_j W_j a_j$ 是输出节点的输入。
 - 误差传播到隐藏层 $\delta_j^h = \delta^o W_j f'(h_j)$
 - 更新权重步长:
 - $\Delta W_j = \Delta W_j + \delta^o a_j$
 - $\Delta w_{ij} = \Delta w_{ij} + \delta_j^h a_i$
- 更新权重, 其中 η 是学习率, m 是数据点的数量:
 - $W_j = W_j + \eta \Delta W_j / m$
 - $w_{ij} = w_{ij} + \eta \Delta w_{ij} / m$
- 重复这个过程 e 代。



Outline

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2/ **Classification**

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How to do classification using neural network

二元分类:

多元分类:

“**softmax** function is a generalization of the logistic function that maps a length-p vector of real values to a length-K vector of values”

$$\sigma(\mathbf{z})_j = \frac{e^{z_j}}{\sum_{k=1}^K e^{z_k}}$$



How to do classification using neural network

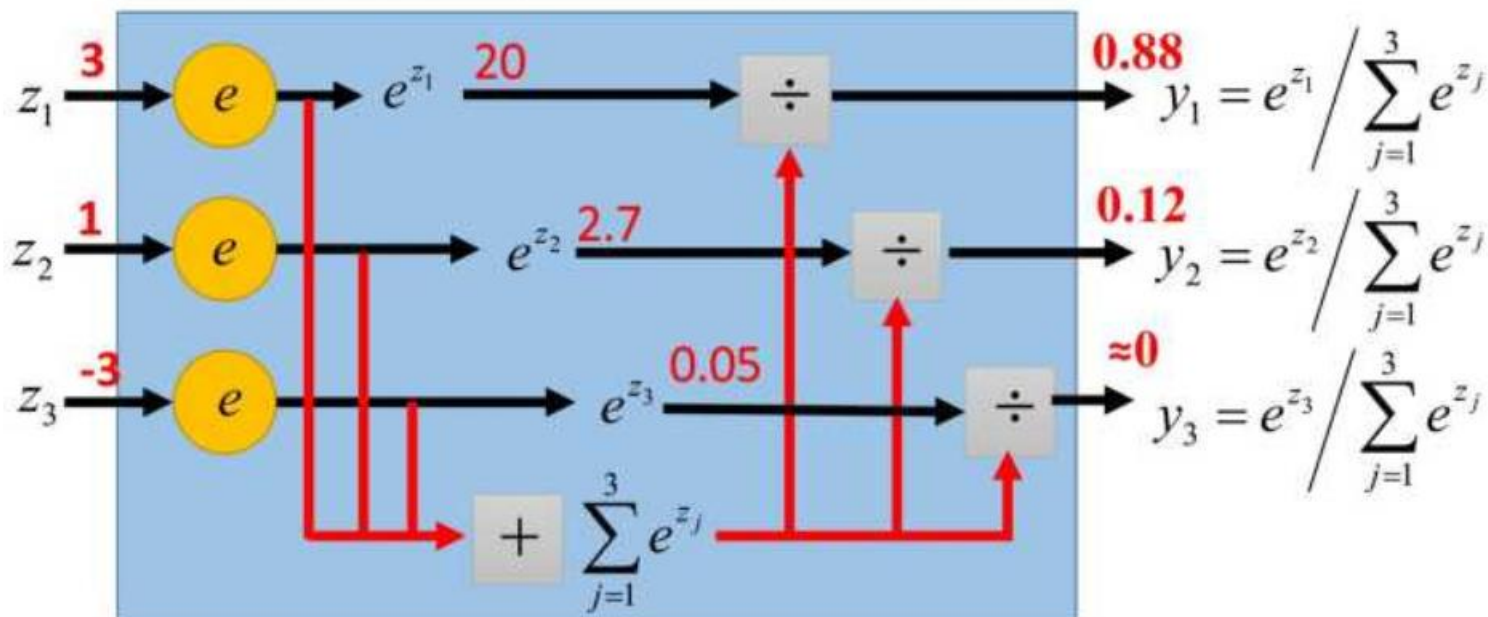
- Softmax layer as the output layer

Probability:

■ $1 > y_i > 0$

■ $\sum_i y_i = 1$

Softmax Layer

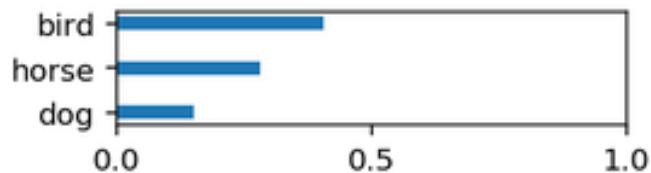




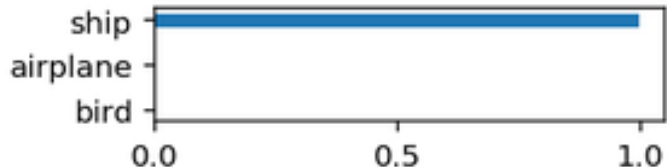
How to do classification using neural network

Softmax Predictions

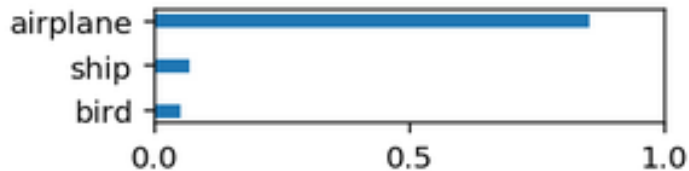
horse



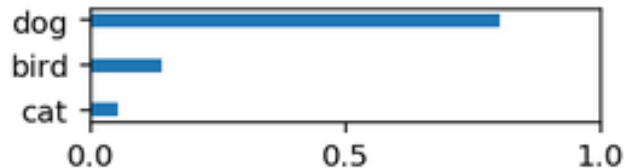
ship



airplane



dog





Outline

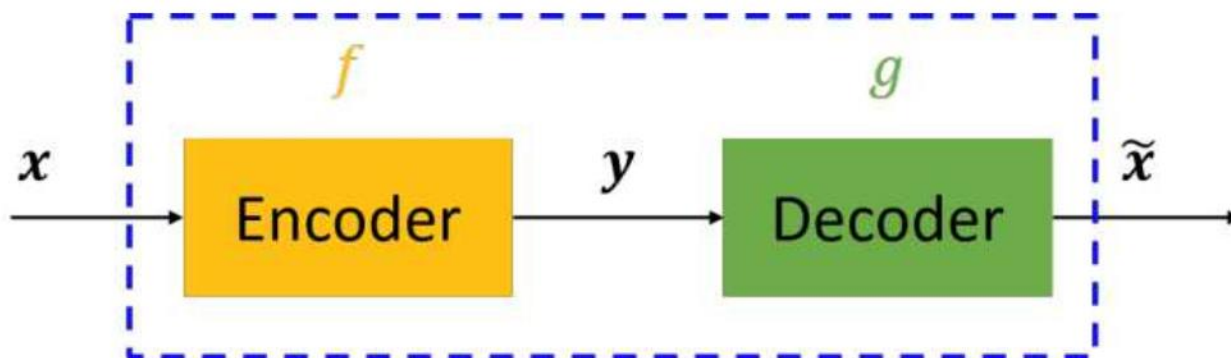
1/ Demo of the project

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Autoencoder



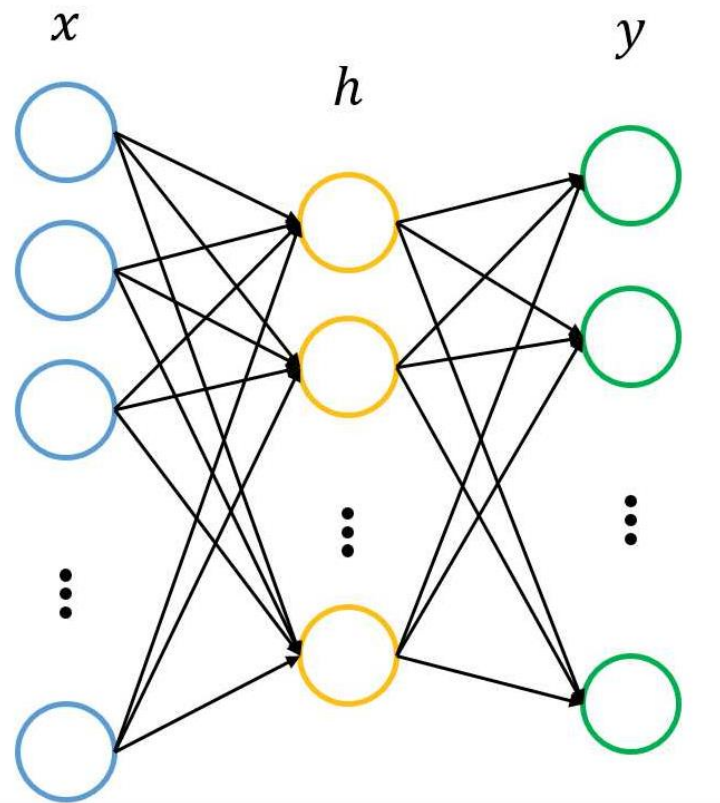
图中，虚线蓝色框内就是一个自编码器模型，它由编码器（Encoder）和解码器（Decoder）两部分组成，本质上都是对输入信号做某种变换。编码器将输入信号 x 变换成编码信号 y ，而解码器将编码 y 转换成输出信号 \tilde{x} 。即

$$y=f(x)$$

$$\tilde{x}=g(y)=g(f(x))$$

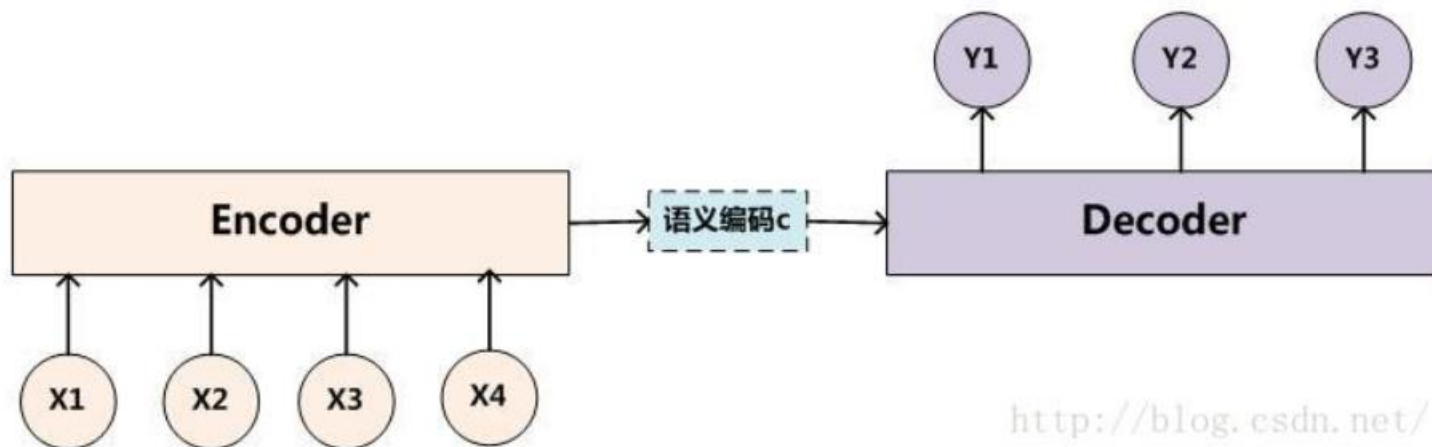


Autoencoder



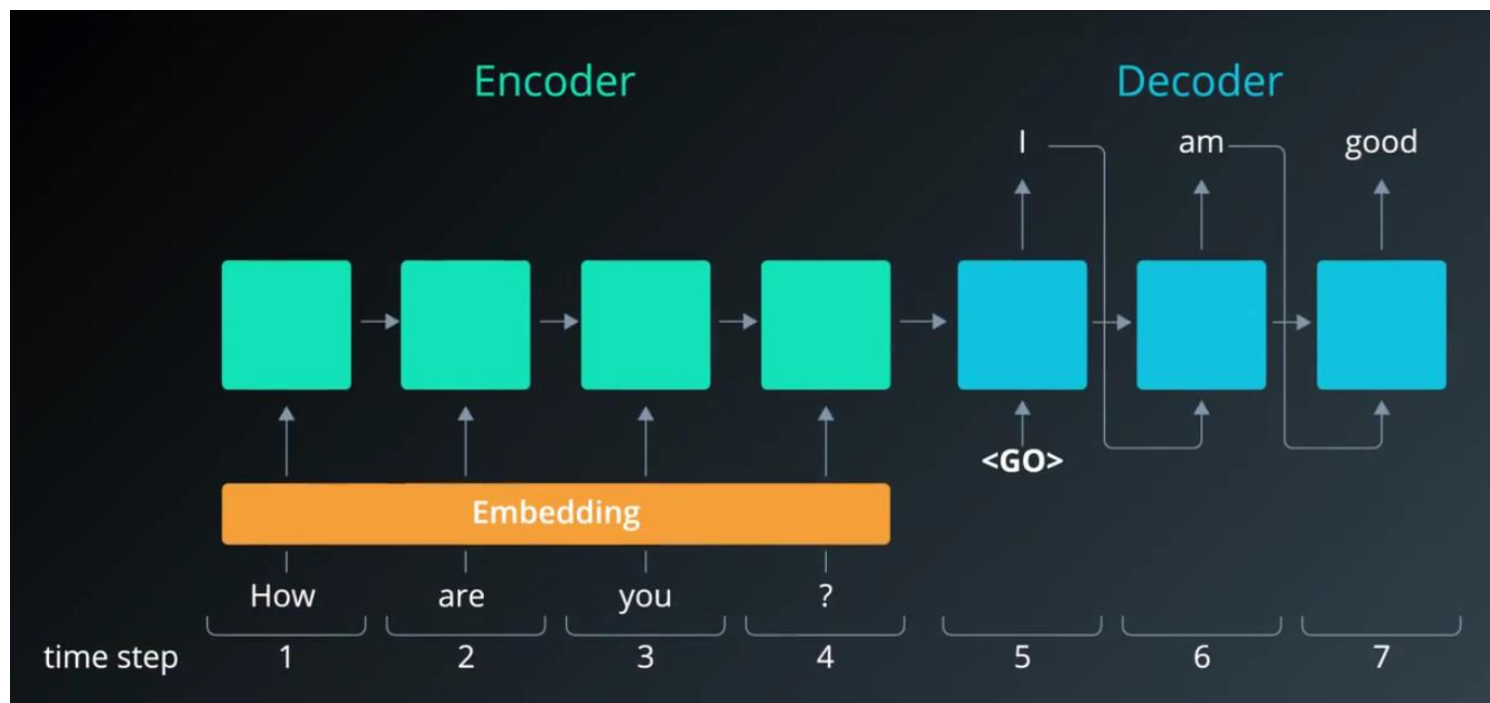


Sequence-to-Sequence model





Sequence-to-Sequence model



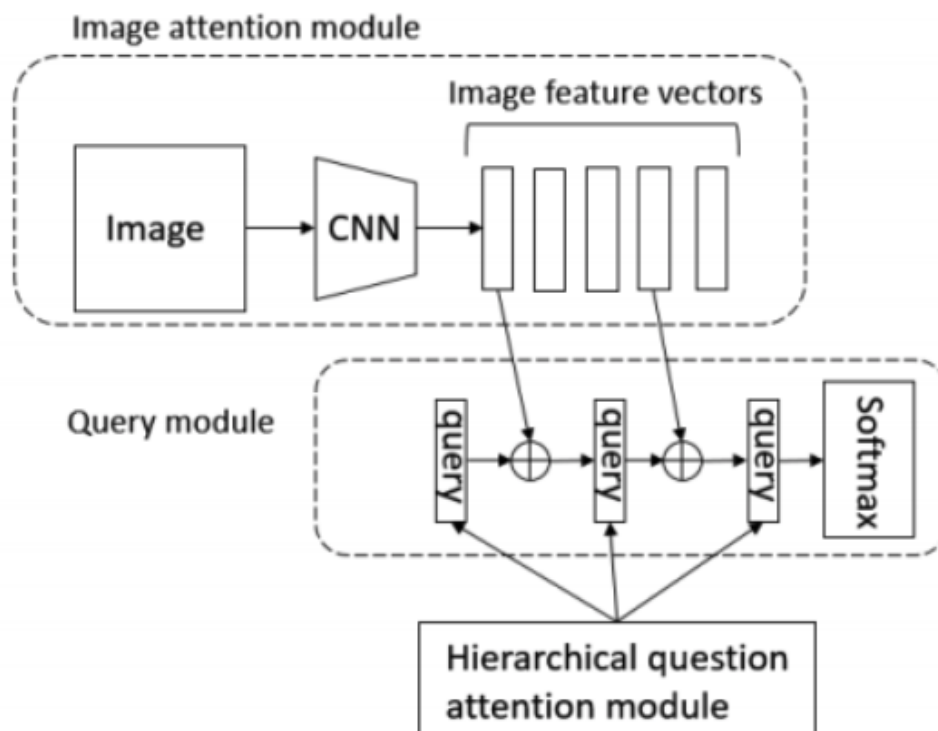


Visual Question Answering

- Aims to solve the holistic scene understanding problem by teaching computers to capture information



Fig.1 Visual Question Answer





Original Image



First Attention Layer



Second Attention Layer



注意事项

- 实验报告截止日期:
- **2017.12.06 晚 23:59:59 前**提交至 FTP 文件夹
- 提交文件:
 - 测试集结果: 15*****_wangxiaoming.txt 每一行对应的是测试样例的标签。
 - 实验报告: 15*****_wangxiaoming.pdf
 - 代码: 15*****_wangxiaoming.zip 如果代码分成多个文件, 最好写份readme



THANKS

