Redes Neurais e Aprendizagem Profunda

INTRODUÇÃO

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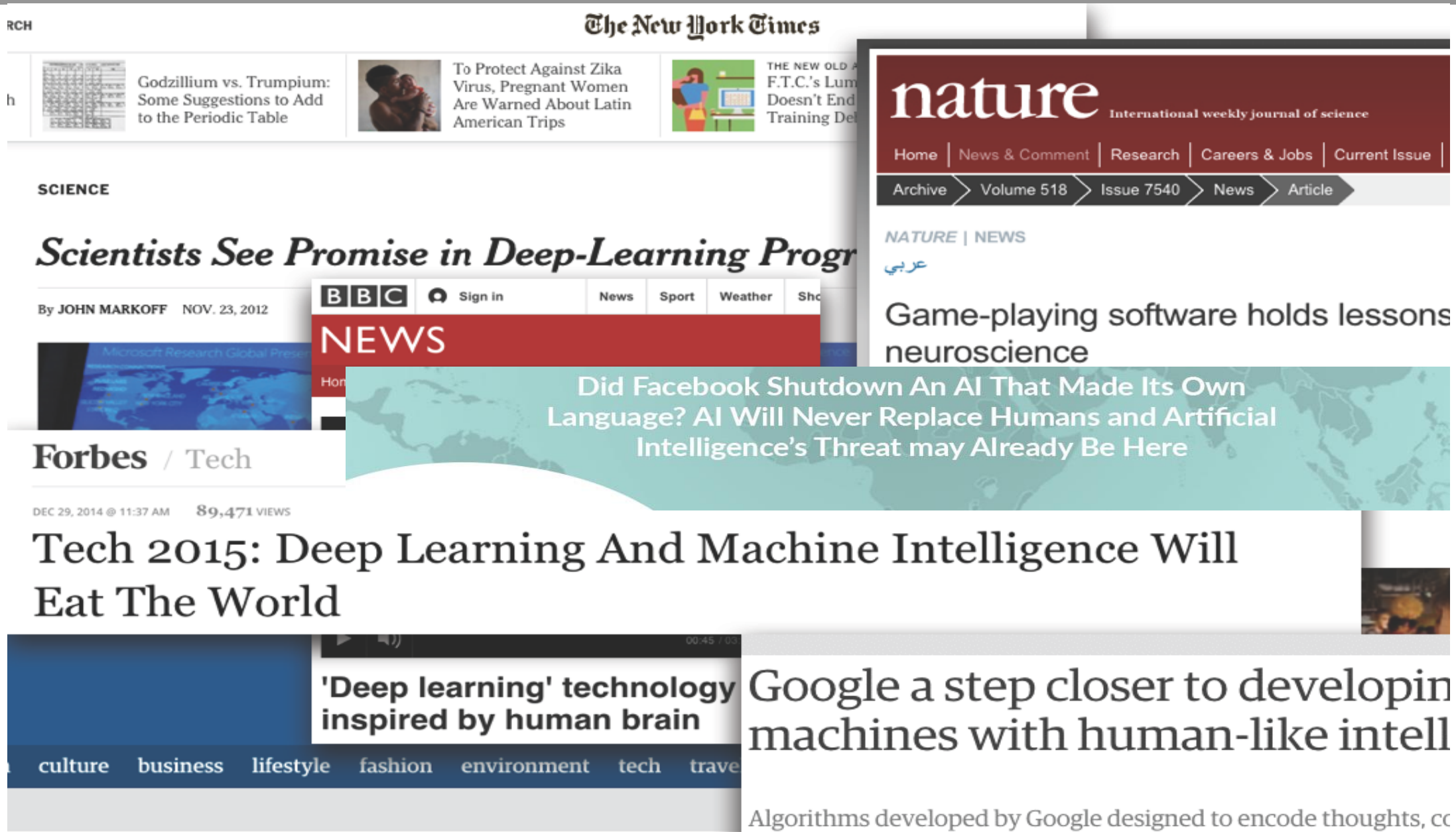
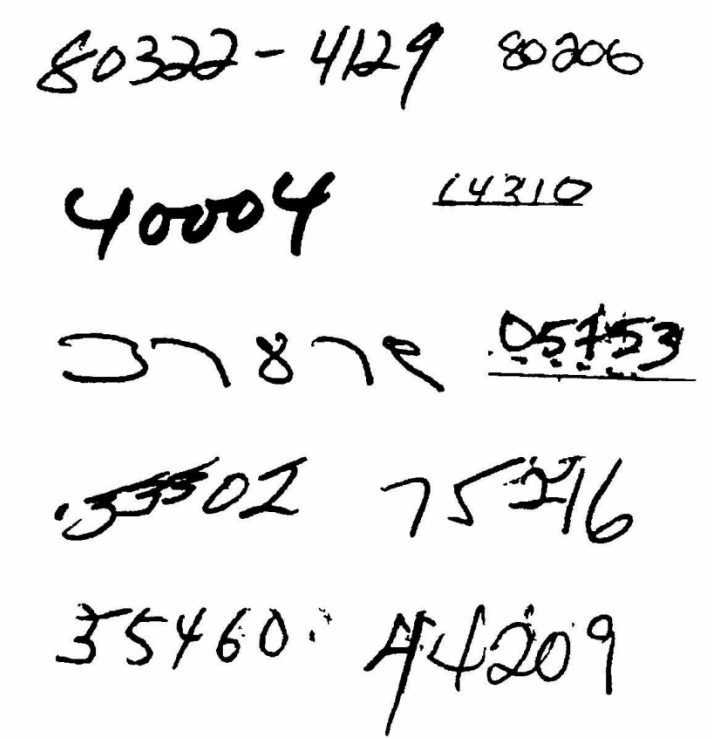
zenilton@pucminas.br

Aprendizagem Profunda: Modismo ou Esperança?



Marcos: Reconhecimento de Digitos

LeNet 1989 (Lecun et al.): reconhecimento de códigos postais utilizada pelo serviço postal dos USA



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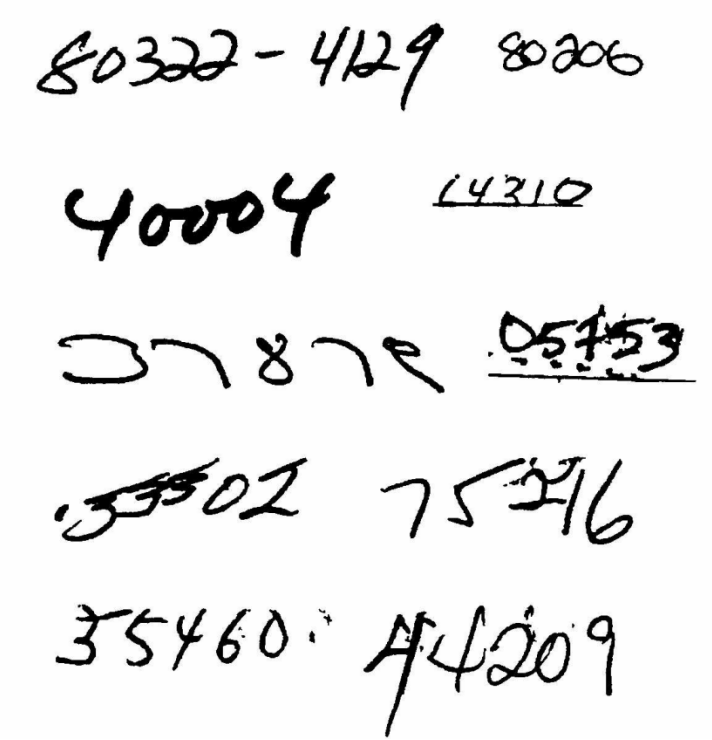
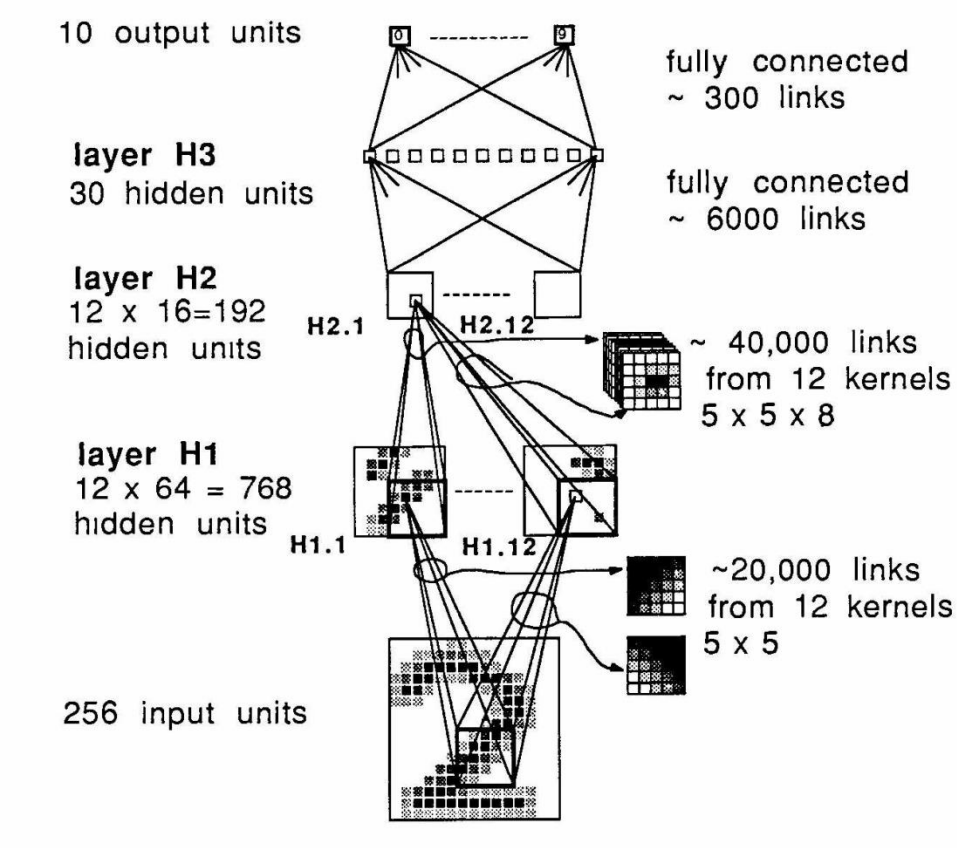
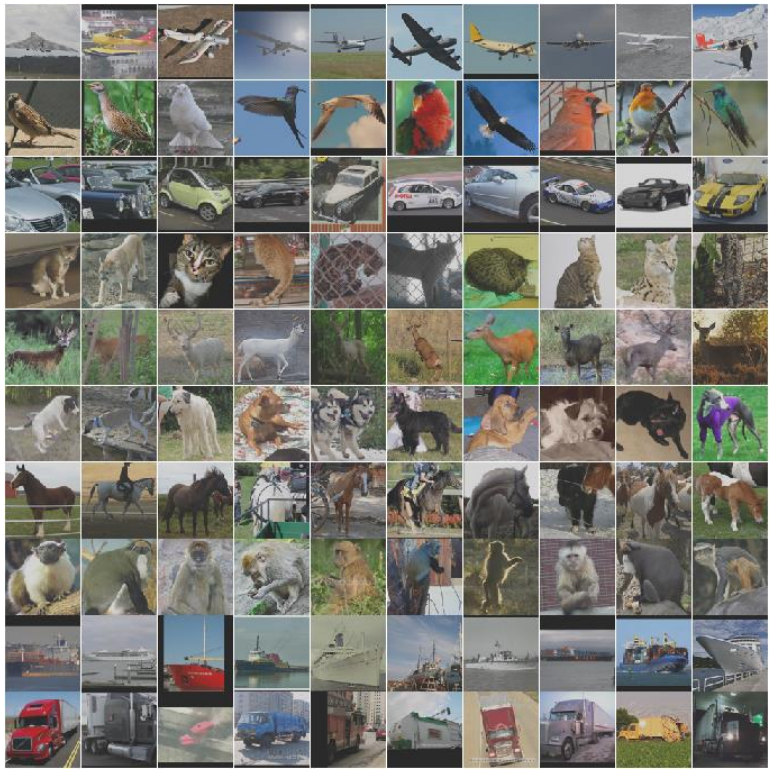


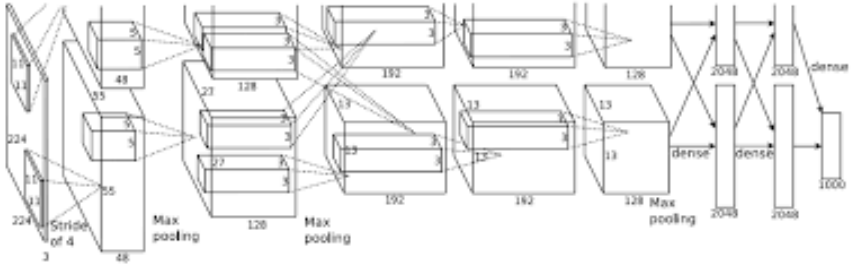


Marcos: Classificação de Imagens

Redes Neurais Convolucionais: AlexNet (2012) treinada com 200 GB de dados da ImageNet



AlexNet



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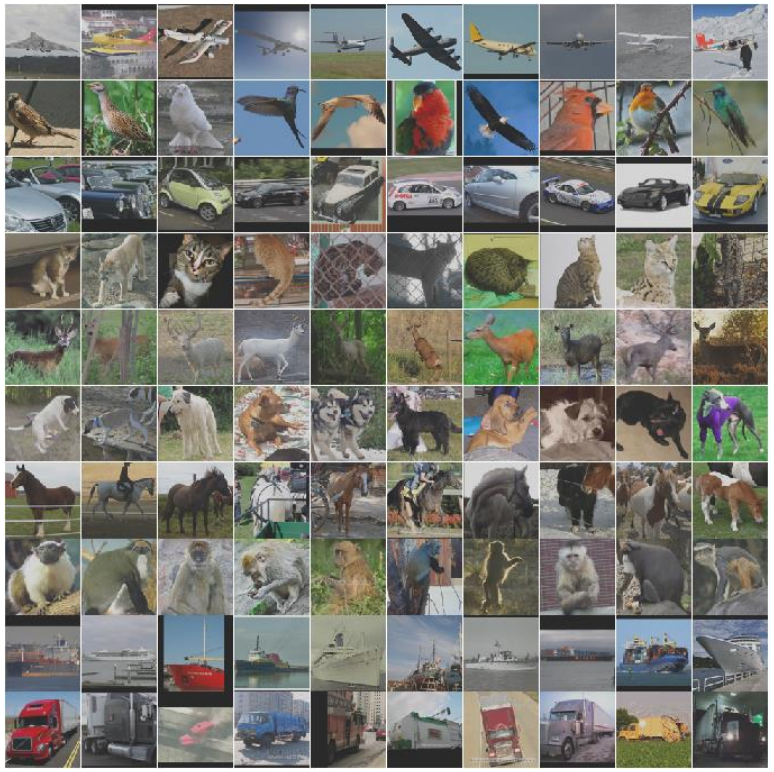

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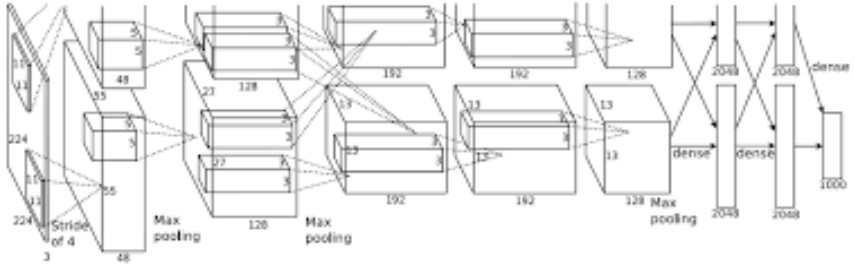
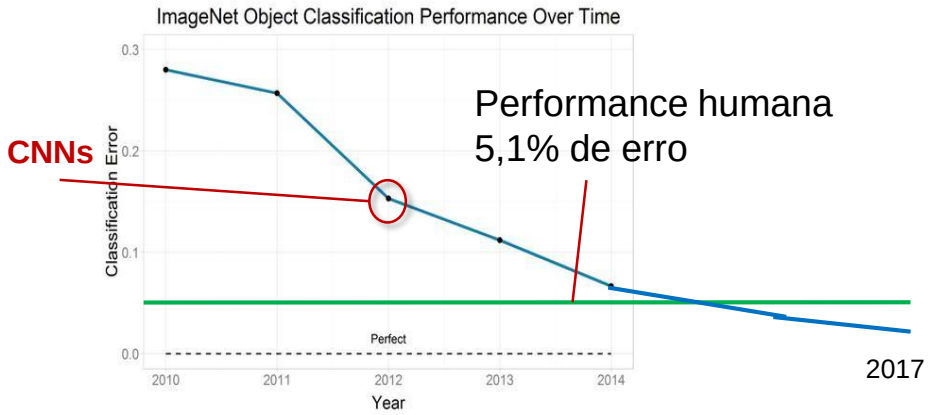
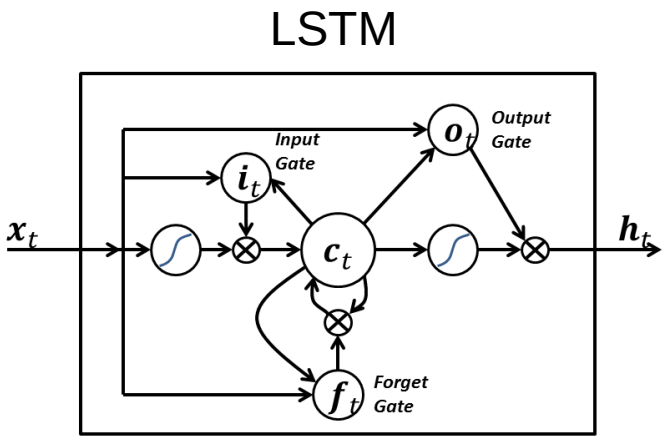




Marco: Reconhecimento de Fala

Redes Neurais Recorrentes: LSTMs (1997)



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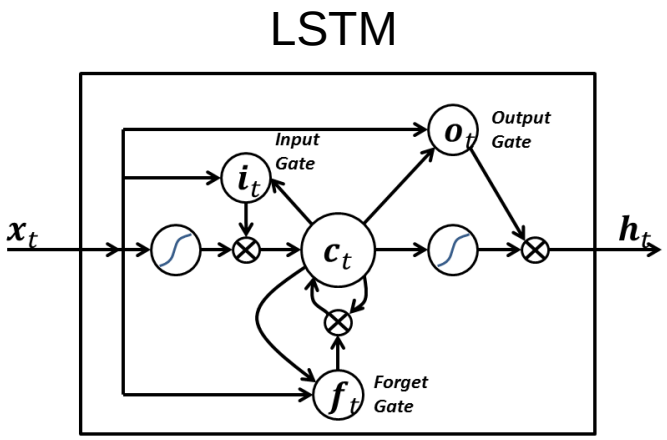

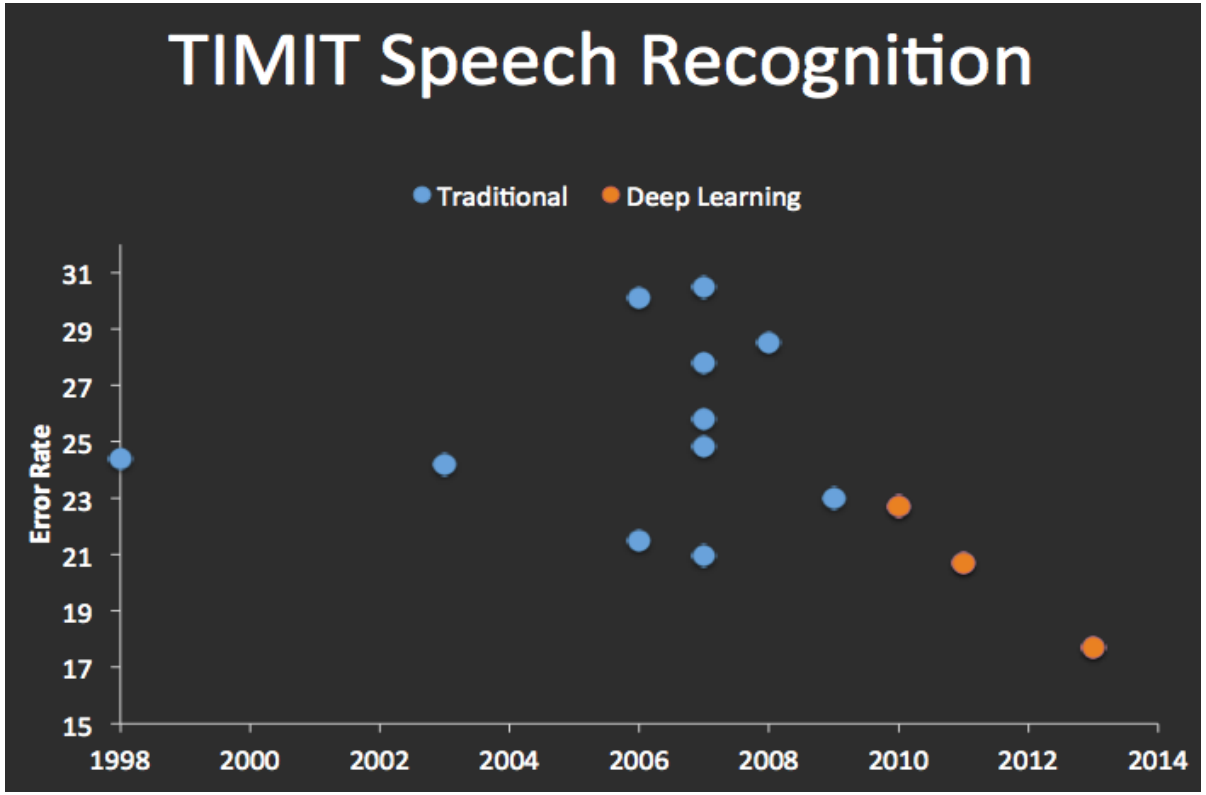

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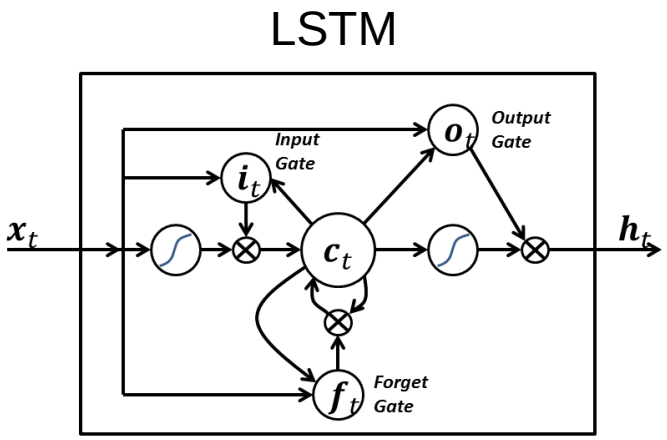
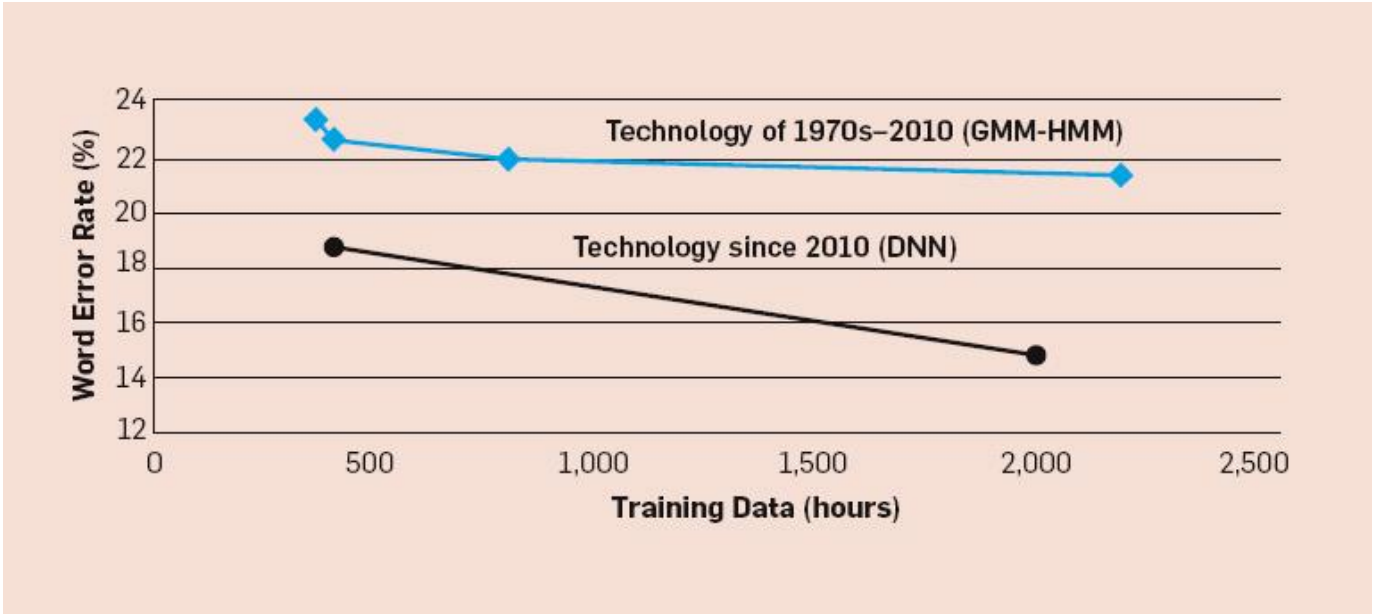
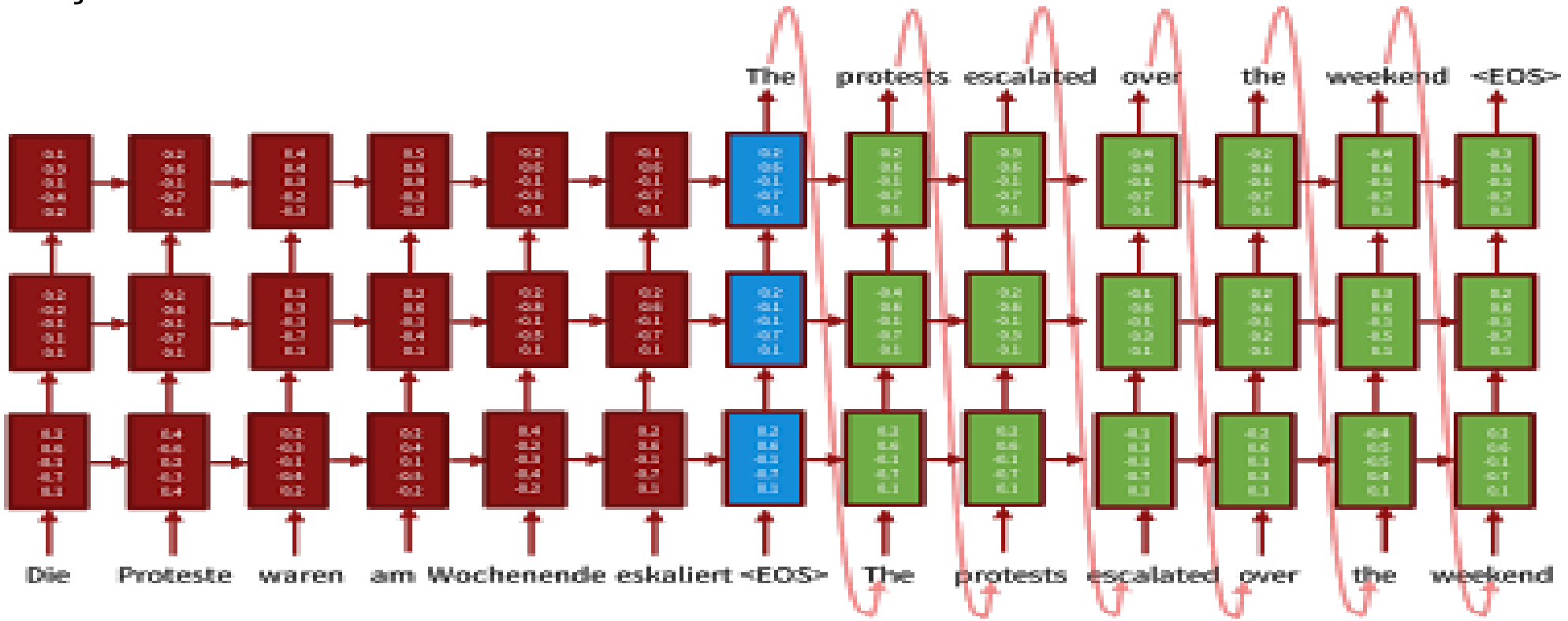




Marco: Tradução entre Idiomas

Modelos S2S (*Sequence-to-sequence*) com uso de LSTMs e de mecanismos de atenção



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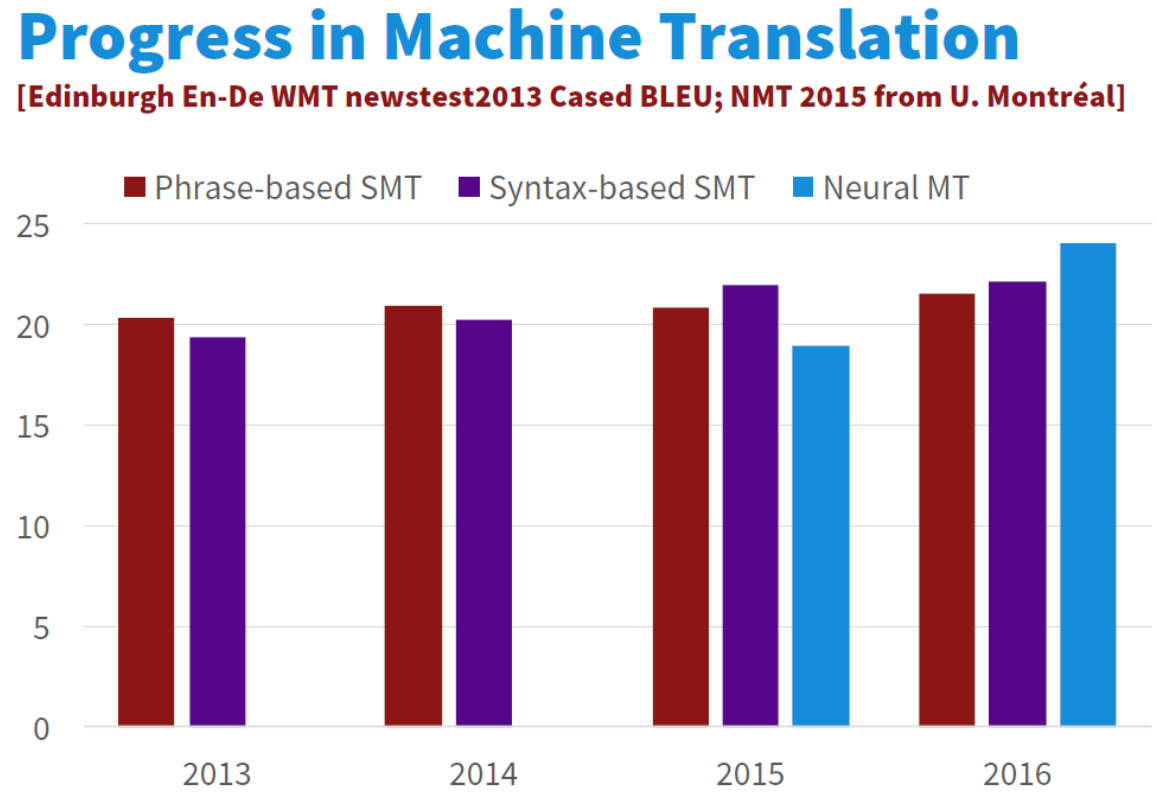

From [Sennrich 2016, http://www.meta-net.eu/events/meta-forum-2016/slides/09_sennrich.pdf]

Avanços no Processamento de Linguagem Natural

Task	Test set	Metric	Best non-neural	Best neural	Source
Machine Translation	Enu-deu newstest16	BLEU	31.4	34.8	http://matrix.statmt.org
	Deu-enu newstest16	BLEU	35.9	39.9	http://matrix.statmt.org
Sentiment Analysis	Stanford sentiment bank	5-class Accuracy	71.0	80.7	Socher+ 13
Question Answering	WebQuestions test set	F1	39.9	52.5	Yih+ 15
Entity Linking	Bing Query Entity Linking set	AUC	72.3	78.2	Gao+ 14b
Image Captioning	COCO 2015 challenge	Turing test pass%	25.5	32.2	Fang+ 15
Sentence compression	Google 10K dataset	F1	0.75	0.82	Fillipova+ 15
Response Generation	Sordoni dataset	BLEU-4	3.98	5.82	Li+ 16a

Críticas

How smart is today's artificial intelligence?

Today's AI is super impressive, but it's not intelligent.

By Joss Fong | joss

INFOWORLD TECH WATCH

By Matt Asay, InfoWorld | MAR 3, 2017

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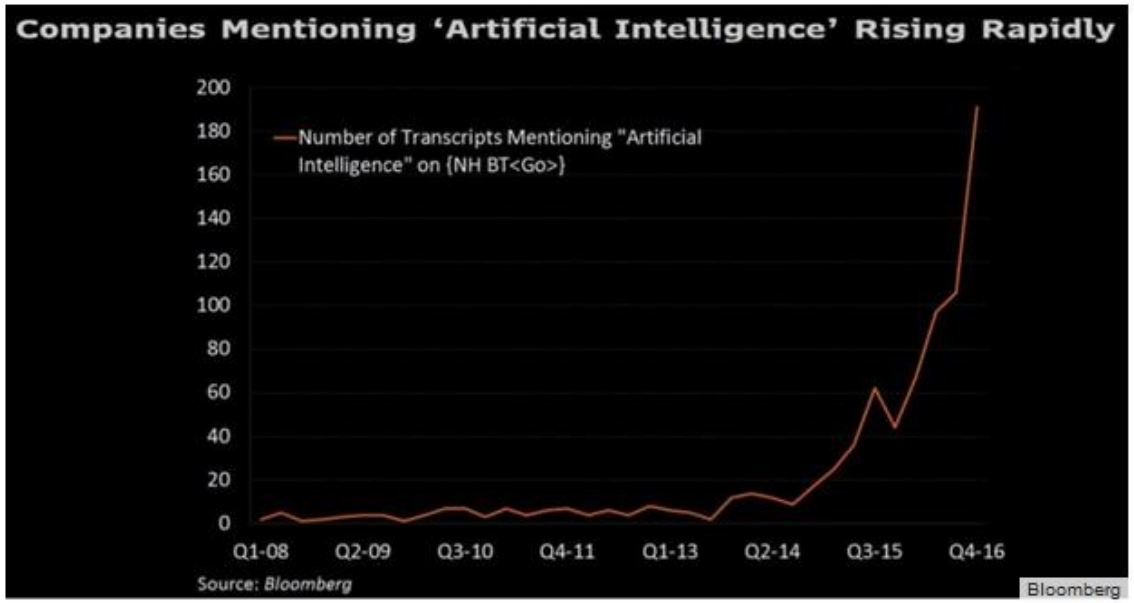
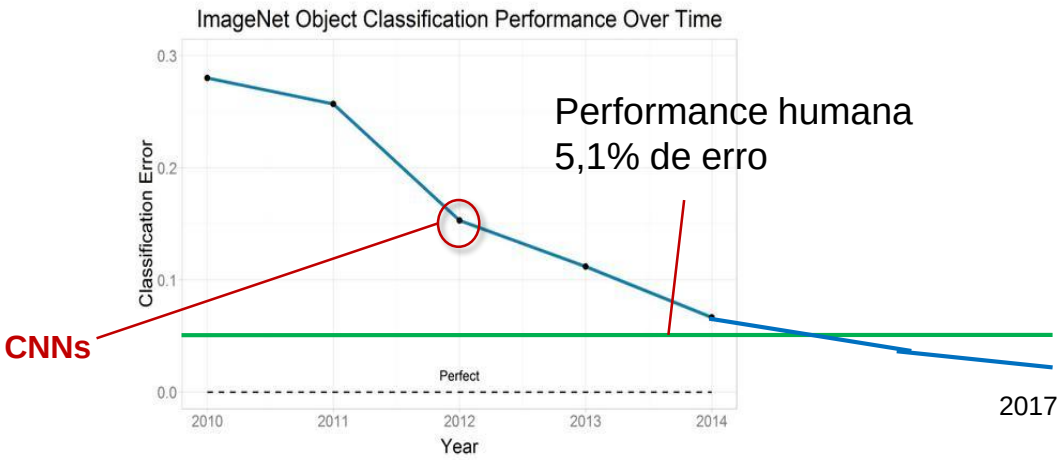
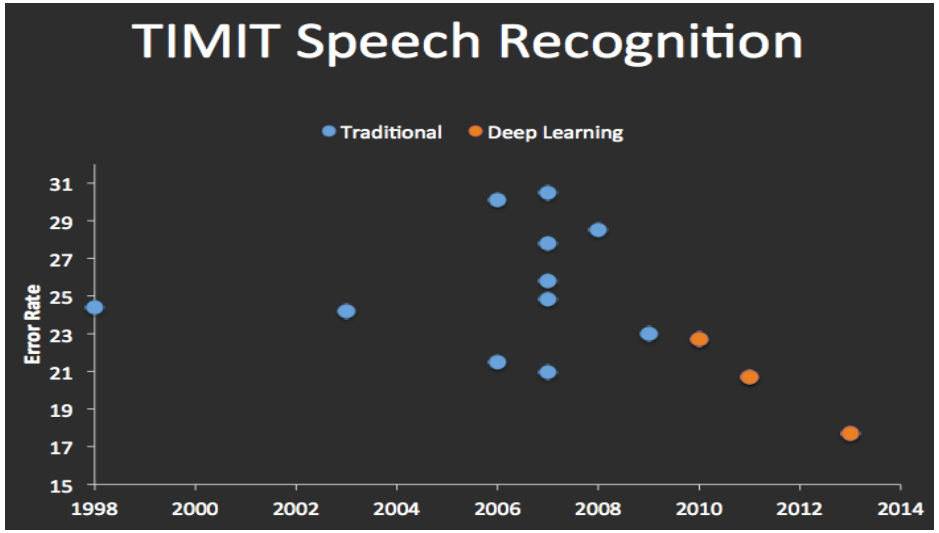


Apredizagem (IA) Clássica × Aprendizagem Profunda





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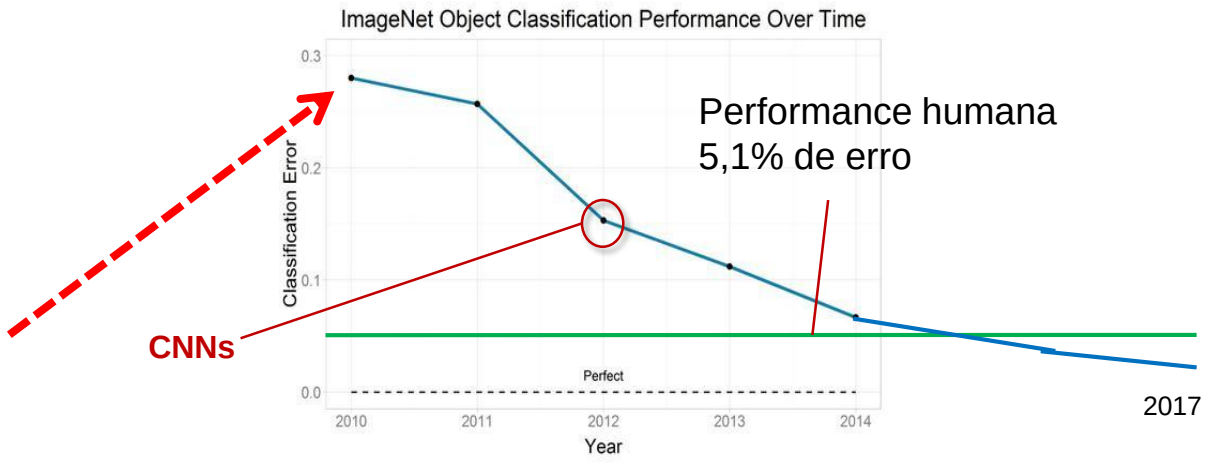
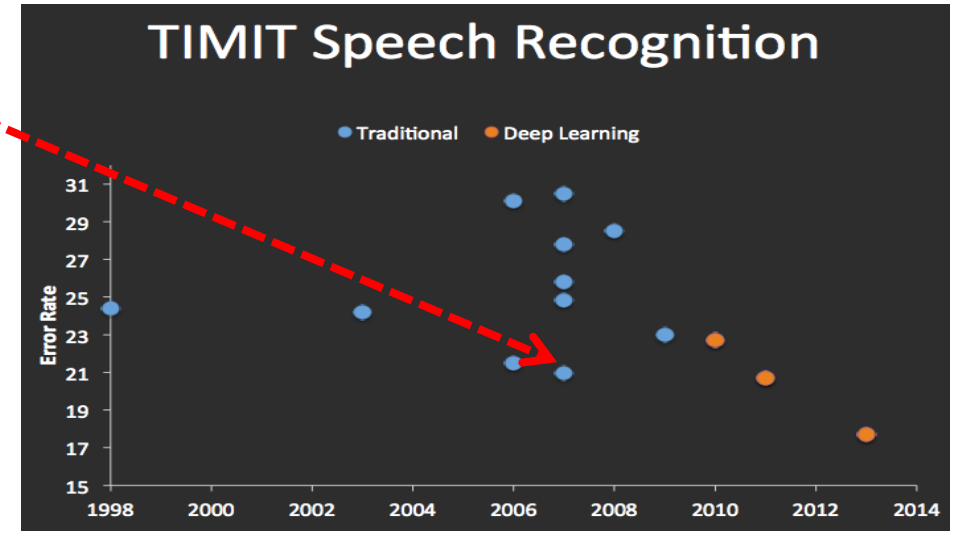
Limite de Performance de Abordagens Clássicas





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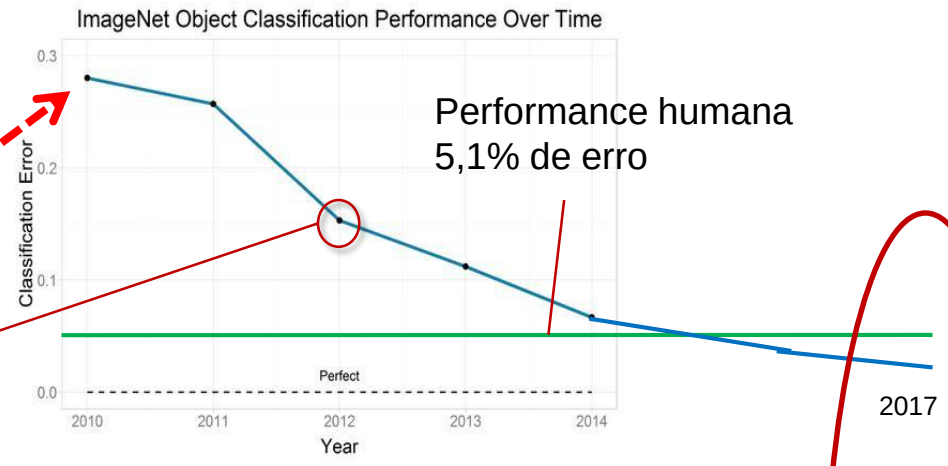

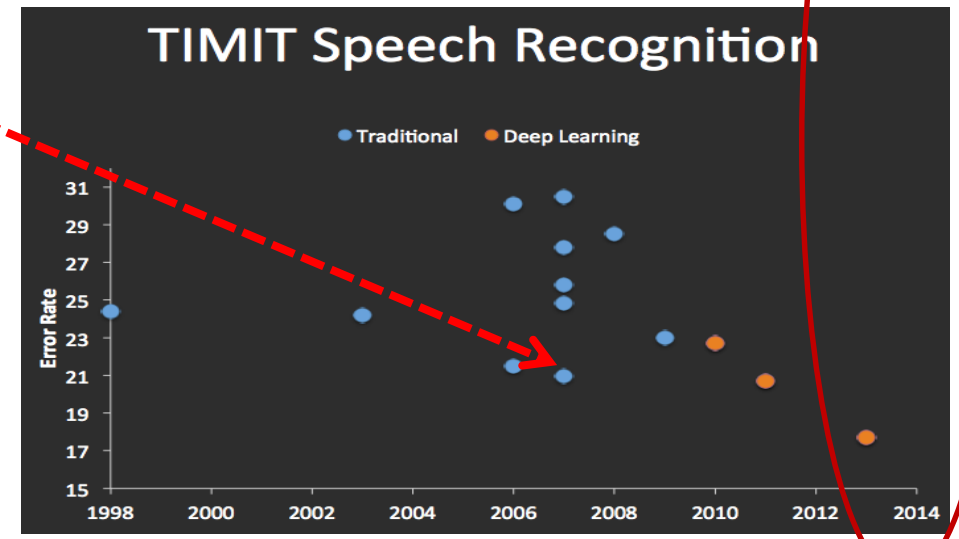

Qual será o limite da Aprendizagem Profunda?

Riscos

Alguns!

- Econômicos: deslocamento de empregos
- Existenciais: segurança, sistemas descontrolados

Hawking, Musk, Gates têm destacado os riscos das novas tecnologias de IA

Aprendendo sobre Redes Neurais e Aprendizagem Profunda

Redes Neurais Profundas exigem

“uma interação entre insights intuitivos,
modelagem teórica, implementações práticas,
estudos empíricos e análises científicas”

Yann Lecun (pesquisador-chefe do Facebook,
pioneiro em redes profundas)

ou seja,

não existe uma estrutura única ou
conjunto básico de princípios para explicar tudo!