

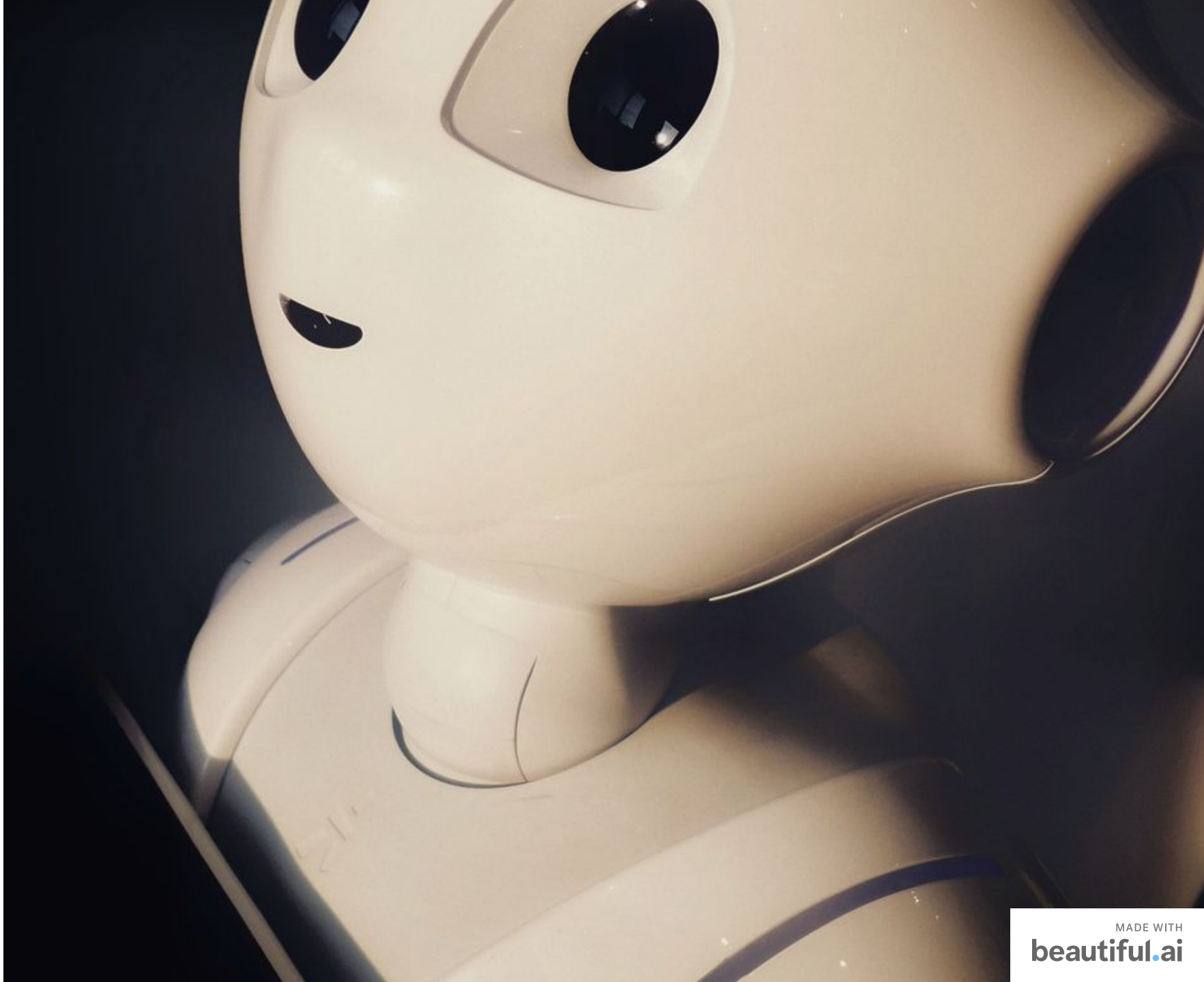
THU LE

Recent Advances in Deep Learning

Outline

- 1** AI - Machine learning: a brief history
- 2** Applications
- 3** Chatbot levels - where are we?
- 4** What to expect?

History of AI



The birth and golden year (1952 - 1974)

- Cybernetics and early NN
- Alan Turing, Turing Test
- Symbolic reasoning, logic theorist
- NLP: Eliza

First winter of AI (1974 - 1980)

- **1970 criticism**

In the 1970s, AI was subject to critiques and financial setbacks. AI researchers had failed to appreciate the difficulty of the problems they faced. Their tremendous optimism had raised expectations impossibly high, and when the promised results failed to materialize, funding for AI disappeared.

AI Boom (1980 - 1987)

- The rise of Expert Systems
- The knowledge revolution
- The Revival of Connectionism

Second winter of AI (1987 - 1993)

- Collapse of the market for specialized AI hardware
- Late 1980, the Strategic Computing Initiative cut funding for AI deeply and brutally
- Over 300 AI companies had shutdown, gone bankrupt or been acquired by the end of 1993.

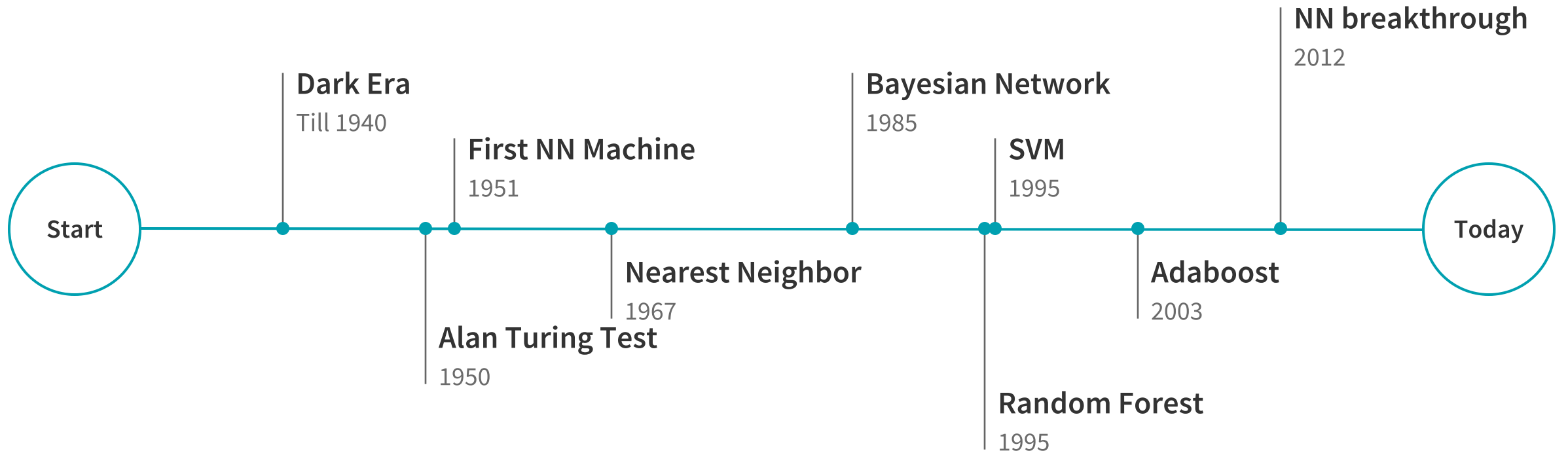
AI today



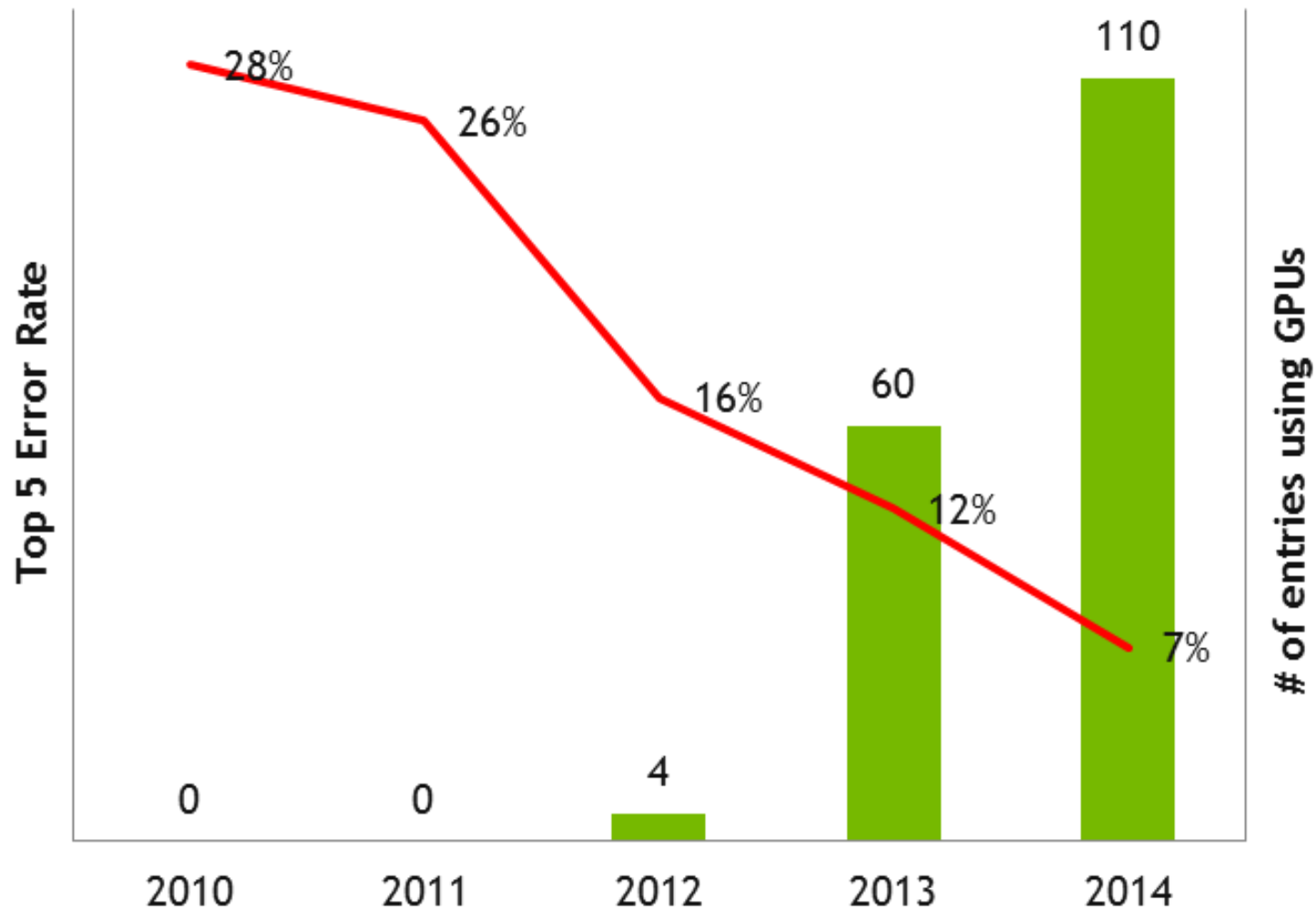
AI behind the scenes

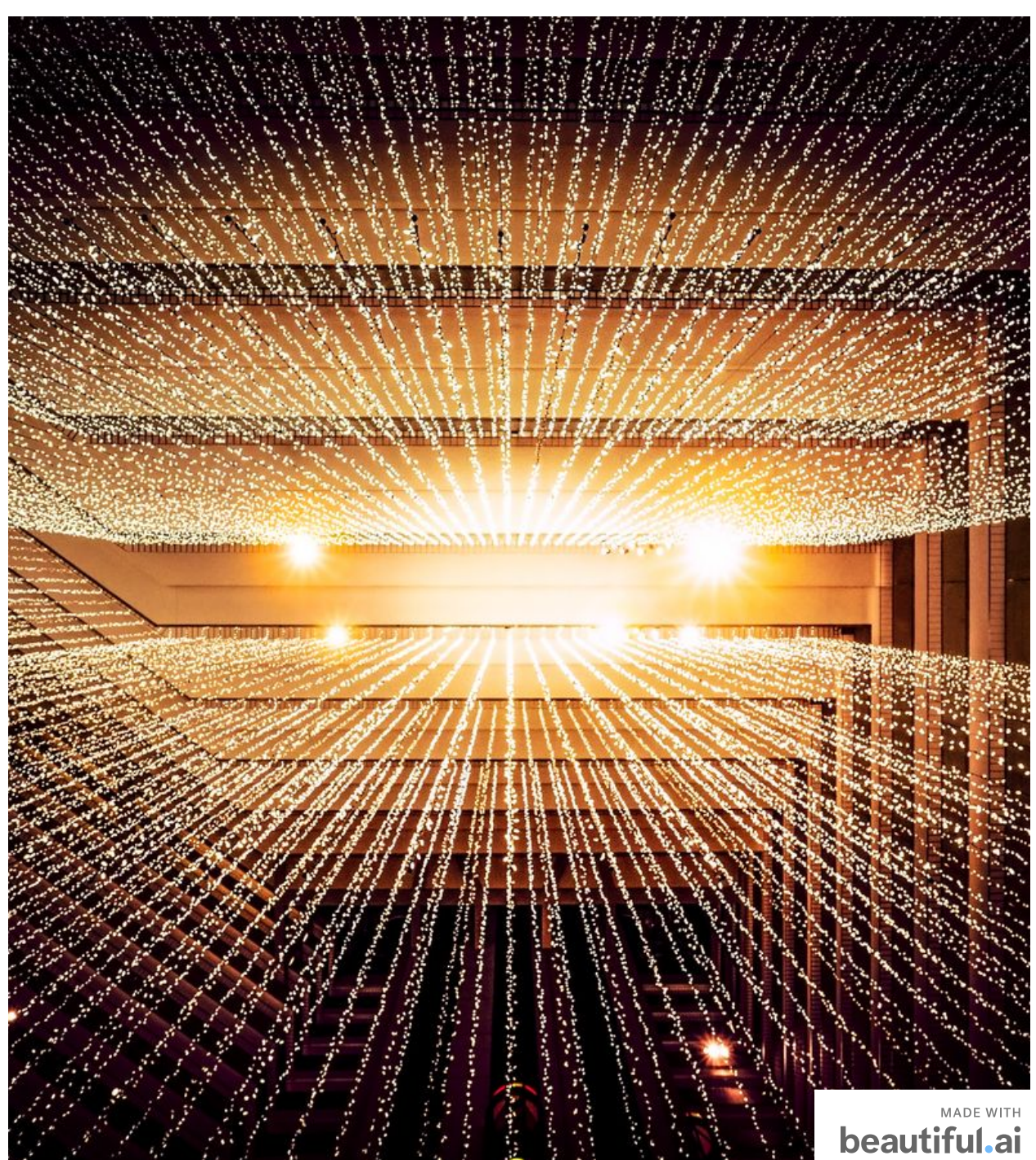
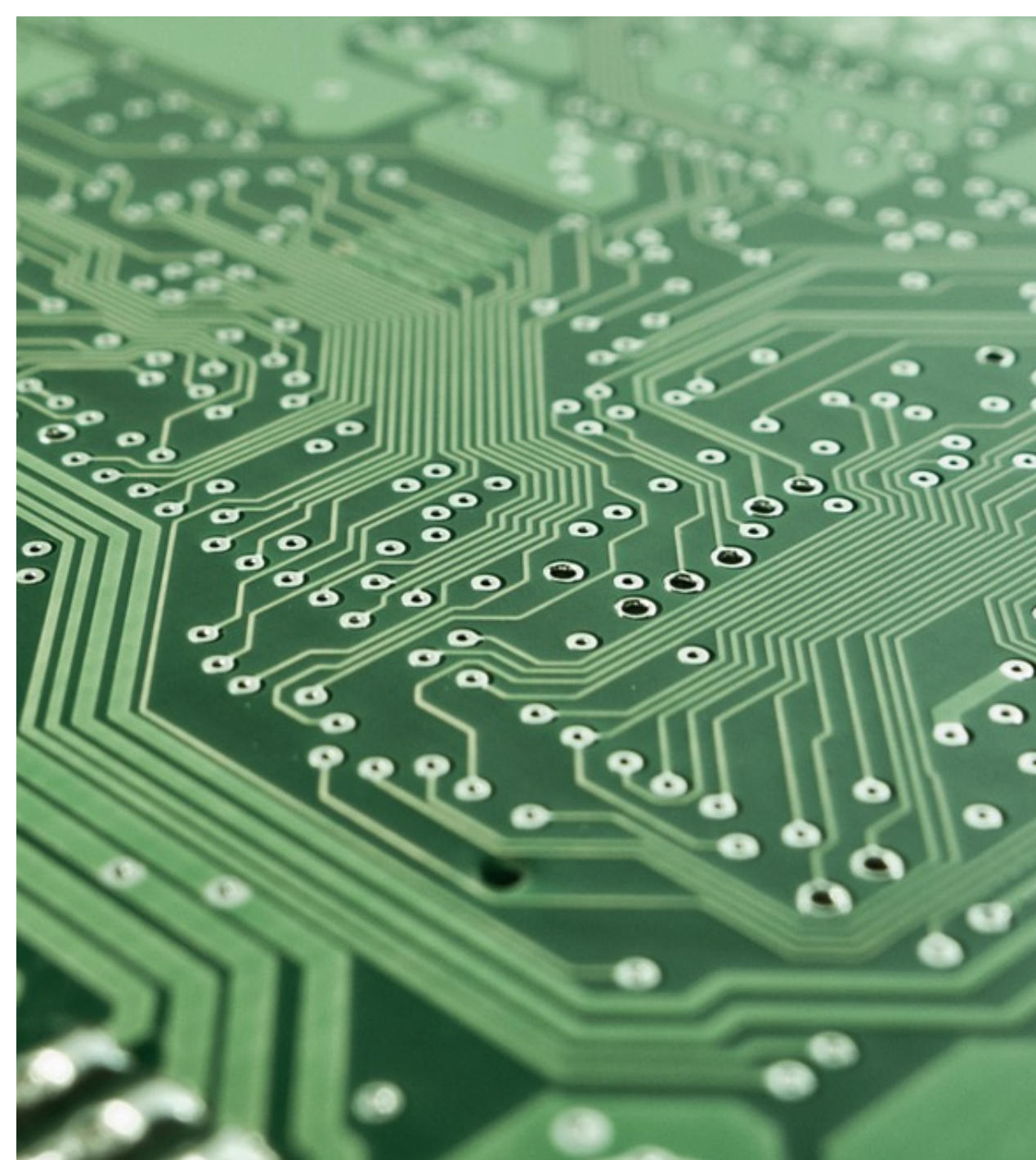
- 1995 Support Vector Machines (SVM) – designed by Cortes and Vapnik.
- 1997 Long short-term memory by Schmidhuber and Sepp Hochreiter
- 1998 Gradient Based Learning by Yann LeCun
- 2009 Launch of ImageNet by Li Fei Fei
- 2011 Creation of Alexnet, a Convolutional Neural Net (CNN) by Alex Krizhevsky
- 2000s Support Vector Clustering and other Kernel methods and unsupervised machine learning methods become widespread

A brief history of Machine Learning



IMGENET

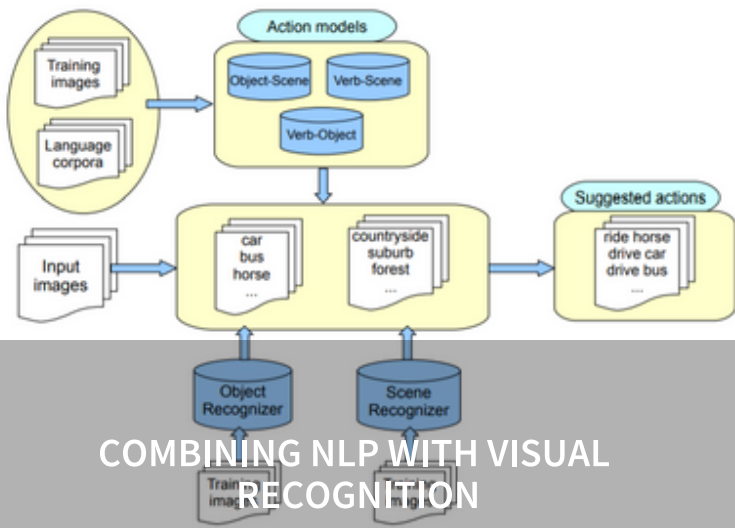




NN Application (1)

Combining Language Models & Visual Recognition





COMBINING NLP WITH VISUAL RECOGNITION

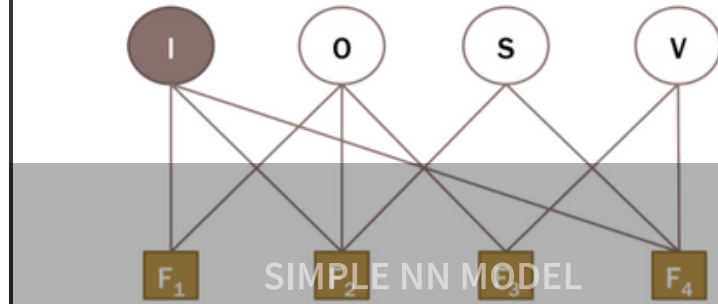


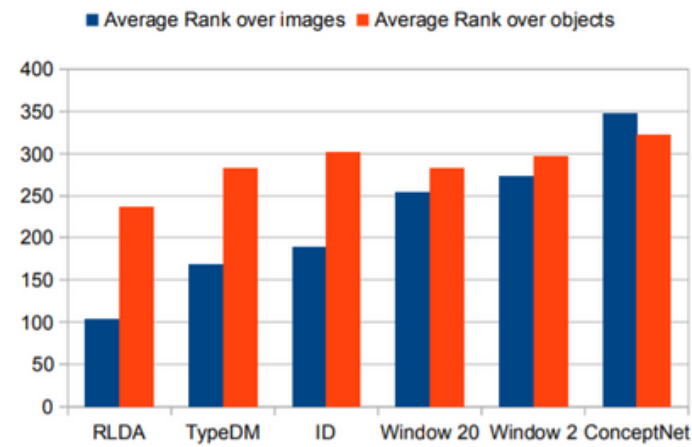
Figure 2. An energy-based model for action recognition
WORK WITH 1 OF THE 4TH WINNING GROUP IN CV 2012

LocatedNear		RelatedTo		UsedFor	
oil car	seatbelt car	horse zebra	plant garden	bottle store.liquid	hc
chair your_bottom	chair school	horse pony	sheep baa	boat fish	table
plant everywhere	muzzle dog	plant green	sheep cloud	dog companionship	cl
trailer car	dog bark_bone	boat ship	cow bull	horse riding	bu
salt table	horse cowboy	chair table	horse riding	chair sitting	table
stool table	carriage horse	dog wolf	sheep farm	chair sit_on	bo
pasture cow	horse fence	dog cat	cow milk	car transportation	bottle
cat dog	whisker cat	sheep lamb	table desk	sheep wool	boat fl
horse zebra	desk chair	sheep wool	cat feline	table put_thing_on	tab
cat household	train railroad	dog a wolf	dog canine	boat travel_on_water	cat c
horsechair horse	sheep wool	cat dog	plant flower	chair sit	cc

LANGUAGE MODEL

	Image	TypeDM	R-LDA	Window2	Window20	C.Net
O_{gs}	0.3	16.1	63.4	16.4	18.3	86.1
O_{rec}	14.9	26.9	66.7	44.7	54.9	115.6
S_{gs}	35.7	181.7	174.9	168.5	174.8	252.5
S_{rec}	46.8	250.5	348	190.2	189.8	241.2
$O_{gs}S_{gs}$	0.28	10.2	15.2	13.8	13.6	81.9
$O_{rec}S_{rec}$	13.6	26.9	66.7	44.7	54.9	115.6

Table 5: Average rank over all images AR_I of the human action recognition using different settings: O_{gs}, O_{rec} use only objects (gold standard and object recognizer); S_{gs}, S_{rec} use only scenes, $O_{gs}S_{gs}$ and $O_{rec}S_{rec}$ integrate both objects and scenes together



Thu Le et. al. Exploiting language models to recognize unseen actions. ACM ICMR Texas, USA, 2013

Thu Le et. al. Query classification via Topic Models for an art image archive. ACL, RANLP, Bulgaria, 2011

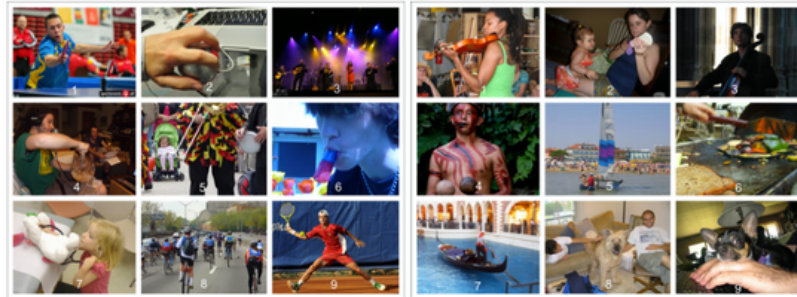
Thu Le et. al. Using language models for visual recognition. EMNLP, Seattle, USA, 2013

Thu Le et. al. Tuhoi: Trento universal human object interaction dataset. COLING, VL'14. Ireland, 2014

Thu Le et. al. Query classification using topic models and support vector machine. ACL, Korea, 2012

TUHOI: The Image Recognition task

TUHOI, Trento Universal Human Object Interaction Dataset



Examples of annotated images: **Left:** (1) play ping-pong, hold racket; (2) use laptop, hold computer mouse; (3) use microphone, play accordion, play guitar, play violin; (4) talk on microphone, sit on sofa, pour pitcher; (5) play trombone; (6) eat/suck popsicle; (7) listen/use/hear stethoscope; (8) ride bicycle, wear backpack; (9) swing/hold racket, hit tennis ball; **Right:** (1) sit on chair, play violin; (2) wear diaper, sit on chair, squeeze/apply cream; (3) sit on chair, play cello; (4) hold/shake maraca; (5) ride watercraft, wear swimming trunks; (6) cook/use stove, stir mushroom, hold spatula; (7) drive/row watercraft; (8) sit on chair, pet dog, lay on sofa; (9) click/type on computer keyboard

TUHOI is a Human Object Interaction dataset containing more than 10 thousand images, which have been annotated with more than 2.9 thousand actions. [ImageNet](#) for the [large scale object recognition challenge 2013](#) - the training and validation of the Detection dataset.

• Download the annotation [here](#).
Download the images [here](#).

• **Citation:** Dieu-Thu Le, Jasper Uijlings, Raffaella Bernardi, "TUHOI: The Universal Human Object Interaction Dataset", COLING'14 workshop on Visi

- Combine knowledge learnt from language corpora to visual recognition.
- Two tasks: human action recognition and object prediction
- Language models built from general text corpora outperform the image model when testing on a big general dataset

<http://disi.unitn.it/~dle/dataset/TUHOI.html>

MacBook

NN Application (2)

News tracking





2011-03-24 17/99

PDF

debate

4 a) Beratung des Antrags der Abgeordneten Rolf Hempelmann, Dirk Becker, Hubert...

Role Filter

0 BÜNDNIS 90/DIE GRÜNEN 1 CDU/CSU

2 DIE LINKE 3 FDP 4 SPD

5 government 6 presidency

Sprecherübersicht

Nr	Sprecher	Anzahl Tokens
0	Rolf Hempelmann (SPD):	1108
1	Vizepräsident Dr. h. c. Wolfgang Thierse:	9
2	Vizepräsident Dr. h. c. Wolfgang Thierse:	112
3	Vizepräsident Dr. h. c. Wolfgang Thierse:	10

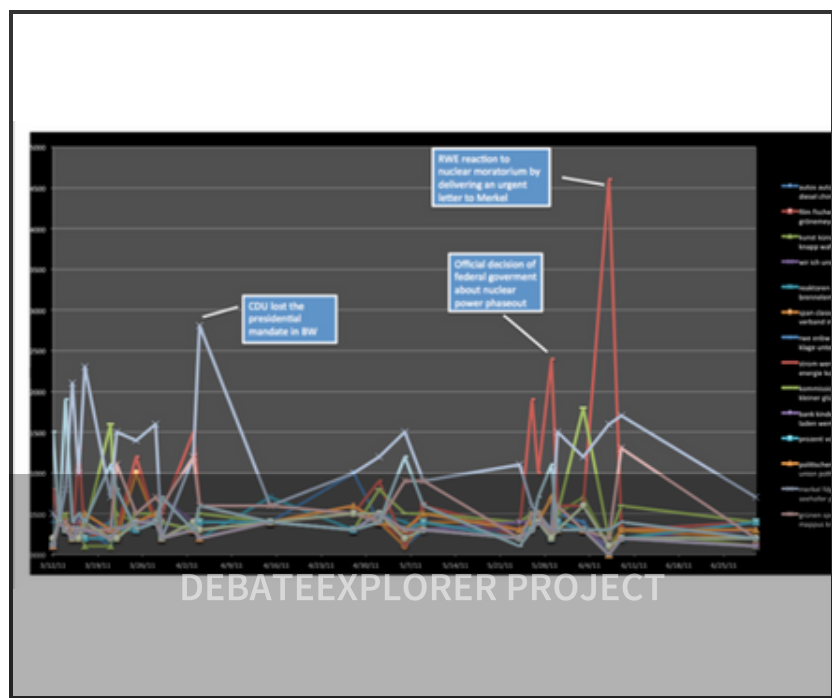
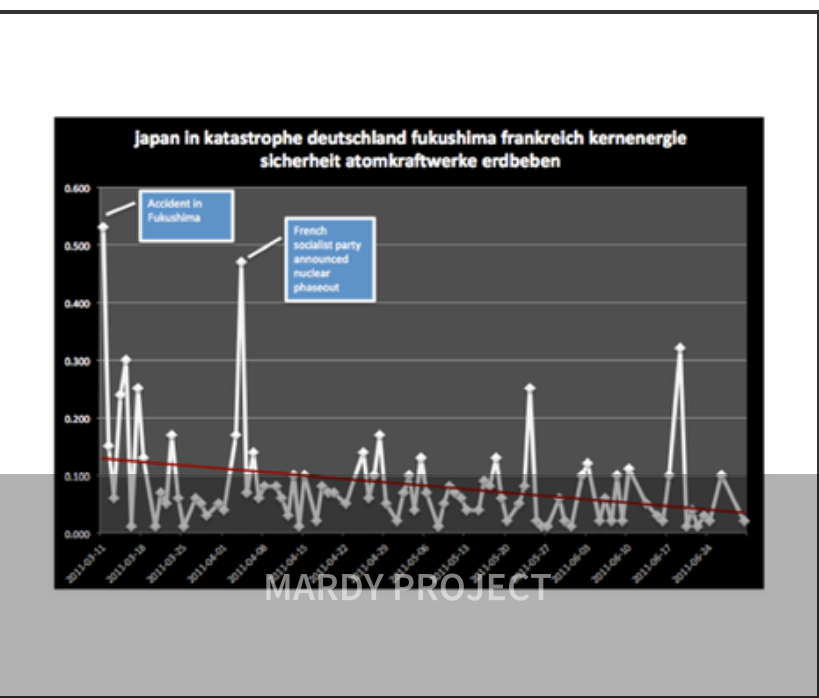
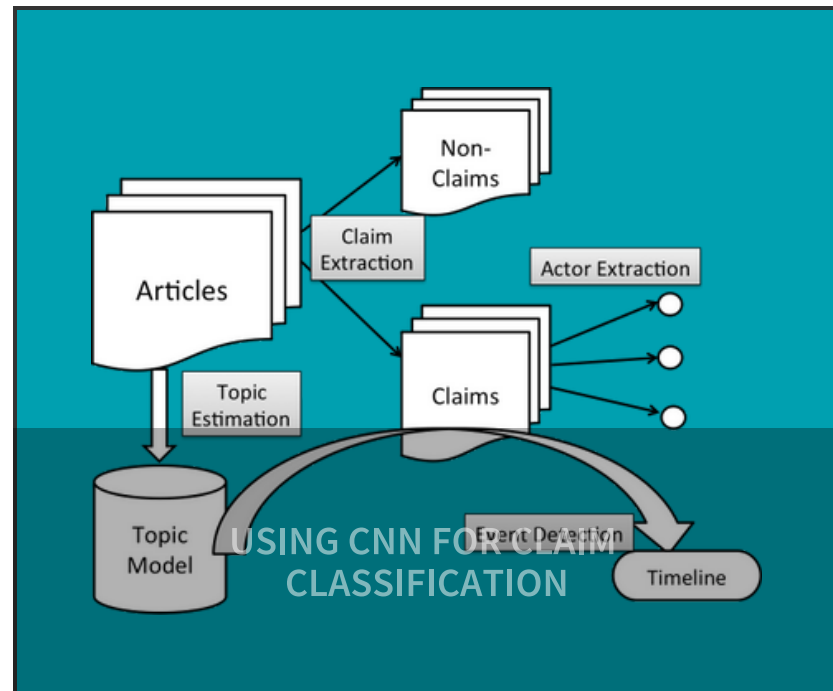
sogar übererfüllt. Wir wollen in Deutschland bis 2020 40 Prozent des CO2-Ausstoßes einsparen. Fakt ist aber, dass die Kernenergie in Deutschland im letzten Jahr rund 150 Millionen Tonnen an CO2-Ausstoß eingespart hat, sprich: Diese Menge wurde nicht emittiert. Wir emittieren im Moment ungefähr 800 Millionen Tonnen CO2. Das heißt, wir reden immerhin über rund 20 Prozent. Unsere Klimaziele wären bei allen Anstrengungen, die wir bisher unternommen haben, ohne die Kernenergie nicht erreichbar.

(Beifall bei Abgeordneten der CDU/CSU und der FDP)

Das kann einem jetzt gefallen oder nicht; aber Adam Riese lässt sich nicht umgehen. Das sind die Fakten, mit denen wir es zu tun haben.

Welche Folgen hätte ein noch schnellerer Ausstieg aus der Kernenergie? Wir haben das Ziel, bis zum Jahr 2020 den Anteil der Erneuerbaren an der Stromversorgung von heute 17 Prozent auf mehr als 35 Prozent zu verdoppeln. Vielleicht schaffen wir sogar ein paar Prozent mehr. Was machen wir aber mit dem Rest? Bei aller Energieeffizienz und bei allen Fortschritten, die wir erreichen wollen, um eine Verdoppelung des Anteils der erneuerbaren Energien von 1990 bis 2020 zu erreichen, wird es sicher nicht gelingen, die Ziele, die wir uns bisher gesetzt haben, mit einem Ausstieg aus der Kernenergie und einem gleichzeitigen Ausstieg bzw. mit einer gleichzeitigen Nichtinvestition, beispielsweise im Kohlebereich, zu erreichen.

Kohle ist der größte CO2-Emitter. Die heimische Braunkohle trägt heute zu 25 Prozent zur Stromversorgung in Deutschland bei. Die Steinkohle trägt heute ebenfalls zu fast 25 Prozent zur Stromversorgung bei. Das heißt, fast 50 Prozent des deutschen Stromverbrauchs werden heute durch Kohle erbracht. Deshalb bleibt auch bei einem so großen Anstrengungen eine Lücke von rund 60 Prozent des Energiebedarfs, die wir im Jahr 2020 mit anderen Energieformen schließen müssen. Ich frage Sie: Wie sollen wir das machen? Einen Einstieg in die CCS-Technologie, um den CO2-Ausstoß durch Kohlekraftwerke zu verhindern, wollen viele nicht. Den Ausstieg aus der Kernenergie wollen wir alle. Wir wollen ihn jetzt sogar noch



VolkswagenStiftung Aktuelles & Presse Förderung 5

Aktuelles & Presse → Aktuelles → DebateExplorer: Wenn Maschine und Journalist zusammen

DebateExplorer: Wenn Maschine und Journalist zusammenarbeiten

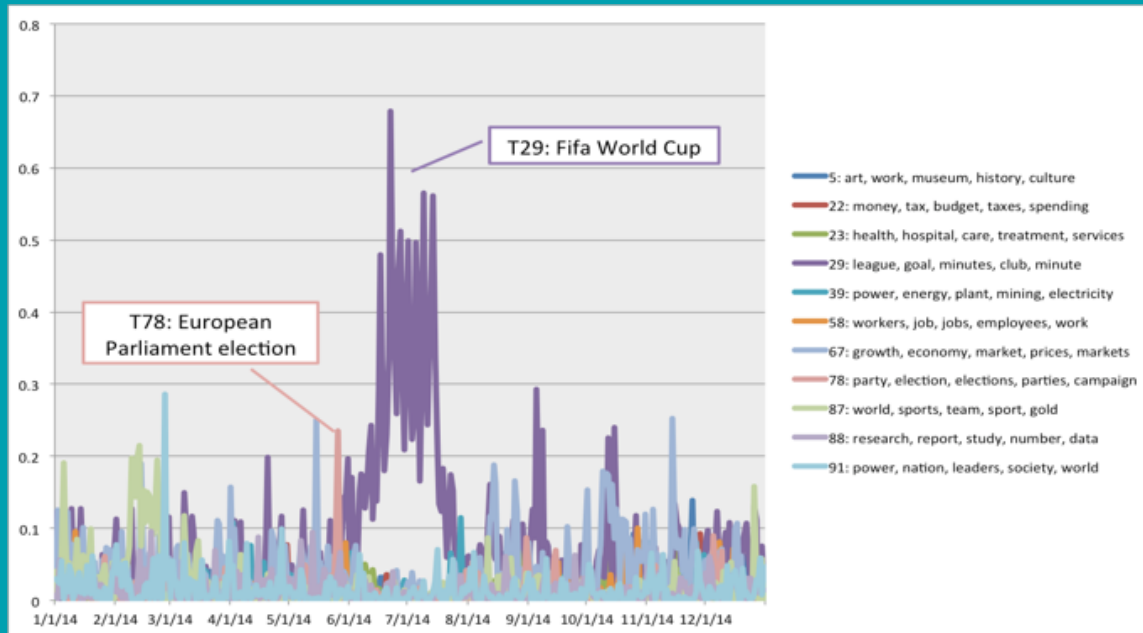
25. Sep 17

200 000 Seiten Text kann kein Journalist mal eben für eine Recherche lesen und einordnen. Aber ein Computer kann das sehr wohl. Wenn er weiß, wonach er suchen soll — und da kommt wieder der Journalist ins Spiel. Der DebateExplorer zeigt, wie Mensch und Maschine zusammen Lobbyismus auf die Spur kommen können.

Beispielthema Datenschutz: Welche Partei setzt sich in der Politik für welche Position ein? Artikel und Berichte dazu bilden immer nur den groben Ist-Zustand ab. Spannender wird es, wenn man Schritt für Schritt herauszufinden will, wie die Debatte eine best...

DebateExplorer

MADE WITH beautiful.ai



Sh

Süddeutsche Zeitung

SZ.de Zeitung Magazin

Virtschaft Meinung Panorama Sport München Bayern Kultur Gesellschaft Wissen Digital Karriere


Wissen

06. August 2014 10:38 Technik

Begriffen auf den Grund gehen - Wortschatz-Portal im Netz




Direkt aus dem dpa-Newschannel

Leipzig (dpa/tmn) - "Altersarmut", "Boxenstopp" und "Feuerpause" sind die Wörter eines Tages. Nachzulesen auf dem Wortschatz-Portal der Uni Leipzig. Die Seite analysiert die aktuelle Presse und zeigt interessante Assoziationsketten auf.



Search in more than 26 million sentences of German newspaper material

Welcome to the Leipzig Corpora Collection / Deutscher Wortschatz
a project of the Natural Language Processing Group at the Institute of Computer Science at Leipzig University.

<p>Corpora portal</p> <p>The international corpora portal offers access to more than 350 corpora of the Leipzig Corpora Collection (LCC) in more than 250 languages.</p> <p style="text-align: center;"> To the corpora portal</p>	<p>CURL portal</p> <p>On this website you can contribute to corpus collection for under-resourced languages by simply entering a URL.</p> <p style="text-align: center;"> To the CURL portal</p>	<p>CLARIN corpora portal</p> <p>The Wortschatz's CLARIN corpora portal offers access to all corpora of the Leipzig Corpora Collection (LCC) that we already integrated into the CLARIN infrastructure.</p> <p style="text-align: center;"> To the LCC's CLARIN corpora portal</p>
<p>ASV Online Toolbox</p> <p>The ASV Toolbox is a modular collection of tools for the exploration of written language data.</p>	<p>Corpus statistics</p> <p>The corpus and language statistics contain analyses about various aspects of natural language based on our</p>	<p>RESTful webservice</p> <p>Our REST web services allow direct access to our corpora by using any software. Currently, these services are</p>

STARTSEITE IMPRESSUM



← Miaus neun Dezibel Free ride →

Das Wort des Tages

Posted on 9. Mai 2012 | Leave a comment

Das finde ich sehr, sehr schön: Das Wortschatz-Projekt der Abteilung Automatische Sprachverarbeitung (ASV) der Universität Leipzig extrahiert jeden automatisch Tag die wichtigsten Wörter aus verschiedenen Newsdiensten. Da diese thematisch sortiert sind (z.B. Politiker, Ereignis, Ort, usw.) könnte man das auch als Anlass nehmen, kleine Geschichten zu verfassen 😊

Hier entlang zum Wort des Tages: wortschatz.uni-leipzig.de/wort-des-tages/

AUTOREN



Fabian Bross

- Die Identifizierung und ihre (sprachliche) Konstruktion von Identität
- Tipps zum wissenschaftlichen Schreiben
- Wie Lingua zu Glossa wird

BLOGROLL

Sh


Thu Le et. al. Matching and ranking of frequency topics for multilingual readability assessment. *Proceedings of the 2013 Conference on Empirical Methods in Natural Language Processing*, 2013

Hieu Phan, Thu Le et. al. A Hidden Topic-Based Framework Towards Building Applications with Short Web Documents. *IEEE Transactions on Knowledge and Data Engineering*, 04 Feb. 2010

Thu Le et. al. Towards a text analysis system for political debates. *SIGHUM*. Berlin 2016

Thu Le et. al. Matching and ranking with hidden topics towards contextual advertising. *IEEE/WIC/ACM WI*, Australia,

MADE WITH



NN Application (3)

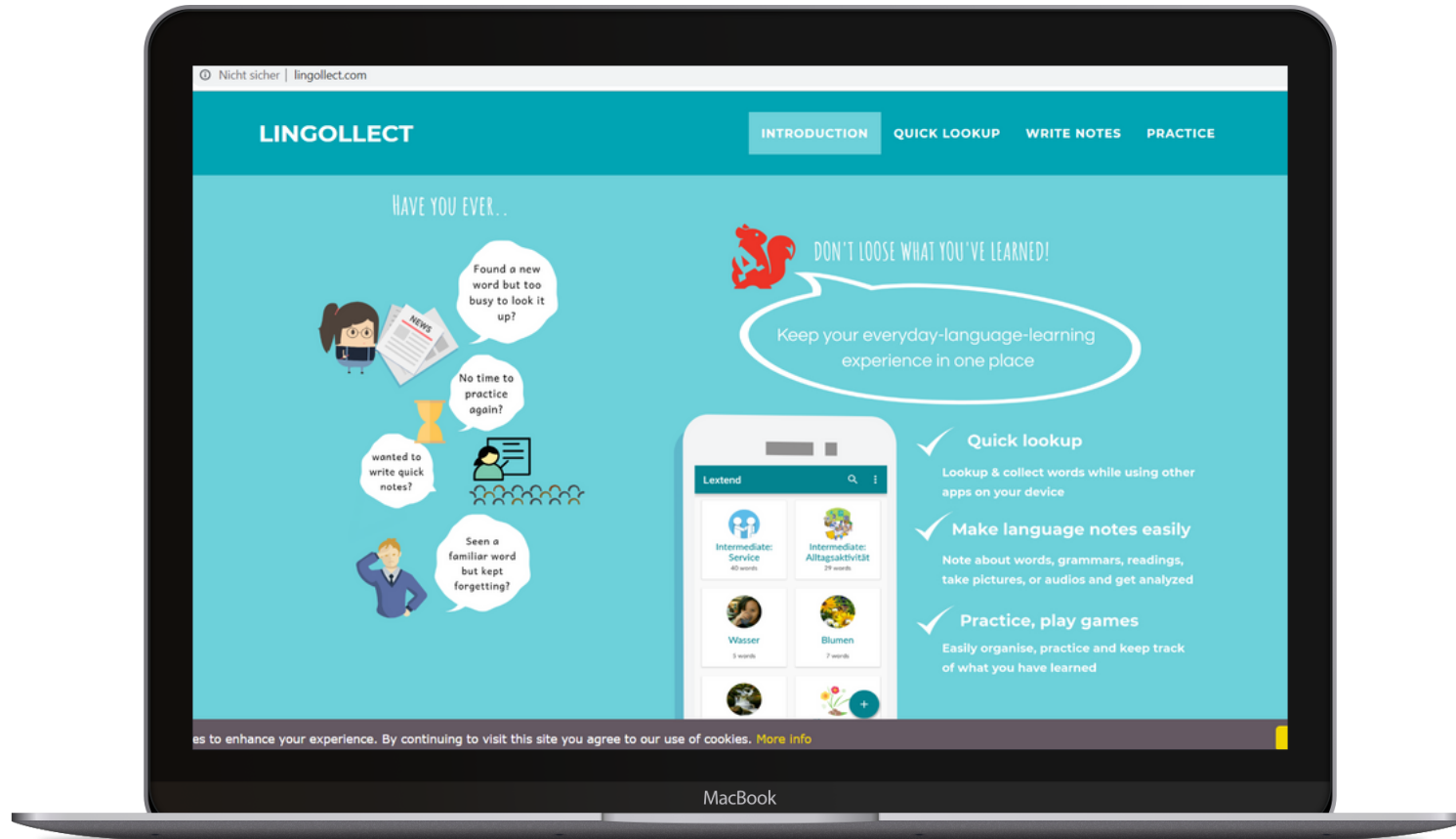
Language Learning



* लॉडिज अण्डर गार्मेन्ट्स,
पोते तथा पोतेमा तिलहरी हालनेकाम

Video

Lingollect: An ecosystem for language learning



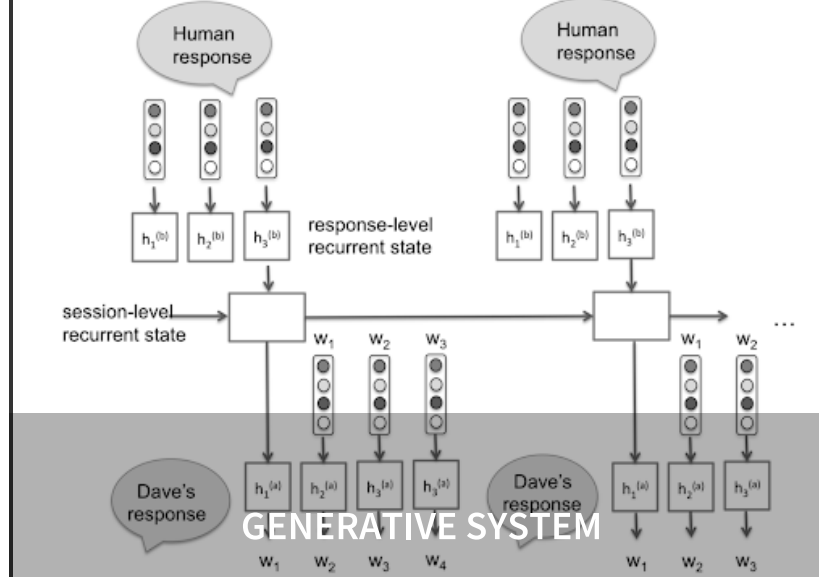
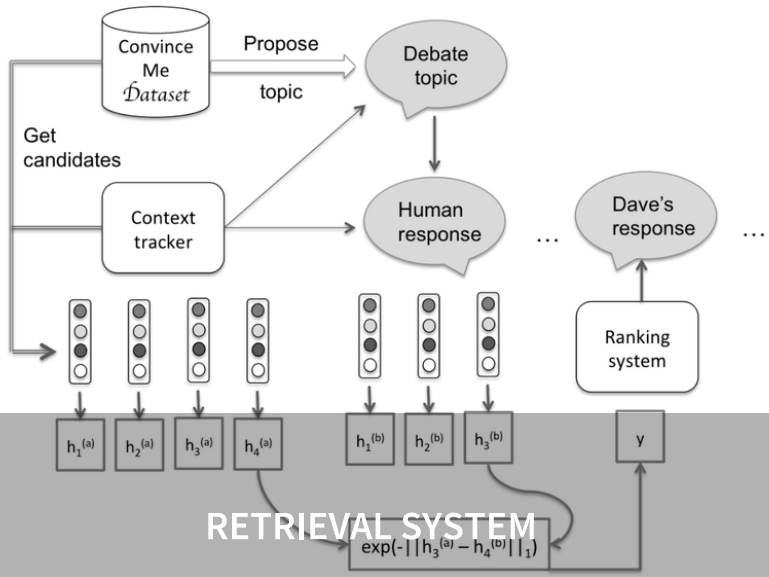
- We use Big Data analysis with billions of reading materials, bilingual sentences in many language pairs
- We apply Language Technologies to detect languages, estimate levels of words /documents, recommend suitable words, sentences and learning materials
- [Developed by Thu Le, Tu Ng.]

<http://lingollect.com>

NN Application (4)

Dialogue system





Topic: *Is anything in this world free?*

Human: Nothing in this world is completely free, there must always be a cost somewhere

Dave: Nothing in this world is free.. Everybody has to pay a price for anything they want or receive.. Life is not free.. Death is not free.. Happiness is not free.. No matter what it is, there will always be a toll.. Nothing in this world is free..

Human: I totally agree with you

Dave: Close, there is no energy cost to giving up life, entropy takes care of that.. But there is an energy cost to having life to give up.. I was running under the assumption that "free" was referring to currency, not energy.. If we're going to argue that energy is a currency for the purposes of this debate, then there's really no debate to be had at all..

Human: Happiness is free

Dave: I'm sorry to ruin your fun, but "picking up a penny on the street" is MOST OF THE HAPPINESS

DAVE DISCUSSING ABOUT HAPPINESS

IBM BEST PAPER AWARD

Thu Le et. al. Dave the debater: a retrieval-based and generative argumentative dialogue agent. Argument Mining. EMNLP. Brussel Nov. 2018



Dave the debater

ONE OF THE FIRST WORK IN BUILDING A BOT THAT MIMICS A DEBATER, MAKING ARGUMENTS AND GIVING RELEVANT RESPONSES TO USERS ON GIVEN TOPICS

Question & Answering

Services

Reading comprehension

Following a Japanese occupation in the 1940s, the Vietnamese fought French rule in the First Indochina War. On 2 September 1945 President Ho Chi Minh declared Vietnam independence from France under the new name of the Democratic Republic of Vietnam. In 1954, the Vietnamese declared victory in Dien Bien Phu which took place between March and May 1954 and culminated in a major French defeat. Thereafter, Vietnam was divided into two political states, North Vietnam (officially the Democratic Republic of Vietnam) and South Vietnam (officially the Republic of Vietnam). Conflict between the two sides intensified in what is known as the Vietnam War, with heavy intervention by the United States on the side of South Vietnam from 1965 to 1973. The war ended with a North Vietnamese victory in 1975

When did Vietnam war end?

Answer

Ask

QUESTION ANSWERING

Oppo

Xin chào, mình là OppoBot. Mình có thể giúp bạn trả lời các thắc mắc về sản phẩm của Oppo. Hôm nay mình có thể giúp gì cho bạn?

Khuyến mại

Oppo

thiết bị, mặt khóa, hướng dẫn tải rom, thông tin bảo hành v.v. Câu hỏi của bạn là gì?

Mình muốn đổi mặt khóa

Chào bạn! Trường hợp này rất mong bạn thông cảm, nhằm bảo vệ quyền riêng tư và bảo mật thông tin khách hàng, bạn vui lòng mang máy đến TTCSKH OPPO gần nhất để được hỗ trợ. Khi đi

Oppo

khó mình nhé. Câu hỏi của bạn là gì?

cho mình tìm địa chỉ bao hành

Chào bạn! Danh sách thông tin chi tiết các Trung Tâm Chăm Sóc Khách Hàng OPPO trên toàn quốc : <http://oppomobile.vn/support/customerservicecenter> Thời gian làm việc của

OPPO CHATBOT

WELCOME TO CHIAKI THE CHICKEN
OUR RESTAURANT CHATBOT DEMO!

CHIAKI HAS BEEN TRAINED ON A SAMPLE RESTAURANT
DATABASE.

ATT CHATBOT
YOUR RESTAURANT GUIDE

Hi there, I'm Chiaki the Chicken. I'm here to help you finding a restaurant.

I'm looking for an Italian restaurant

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RESTAURANT CHATBOT

Video

A blurred background image showing a crowd of people, many of whom are holding and using their smartphones. The focus is on the hands and devices, with the faces and bodies of the people in the crowd being out of focus. A semi-transparent grey rectangular box is centered over the image, containing the text.

Customer Service

[Online shopping \(click here\)](#)

Want to know more?

Try Our API Demo

[HTTPS://LEXTEND.XZY/](https://LEXTEND.XZY/)

[HTTP://LINGOLLECT.COM/](http://LINGOLLECT.COM/)

[HTTPS://CHATT.AI/](https://CHATT.AI/)

LANGUAGE DETECTION

SEGMENTATION, NORMALIZATION

WORD RELATEDNESS

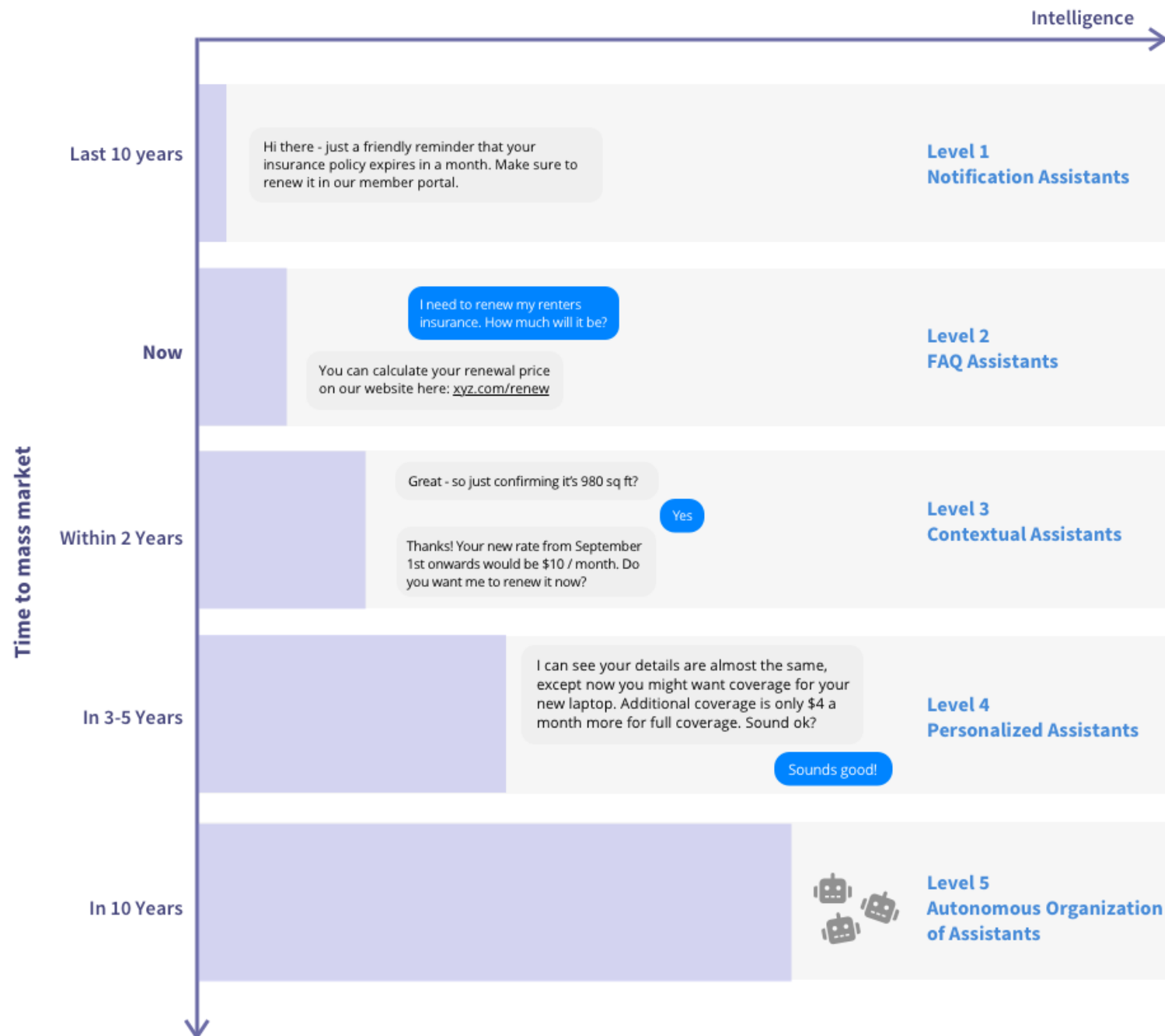
SPELL CHECKING

TRANSLATION (DEU-ENG)

QUESTION ANSWERING

[DEVELOPERS: TL, TN, KN]

Chatbot levels - are we getting there?



The history of AI Hypes

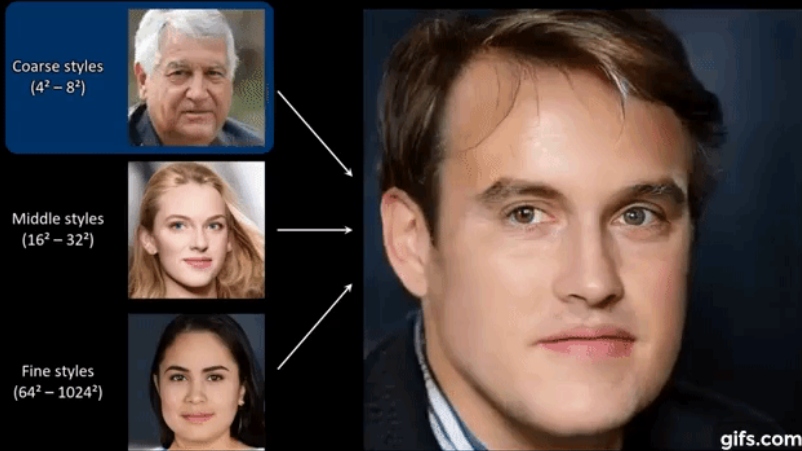
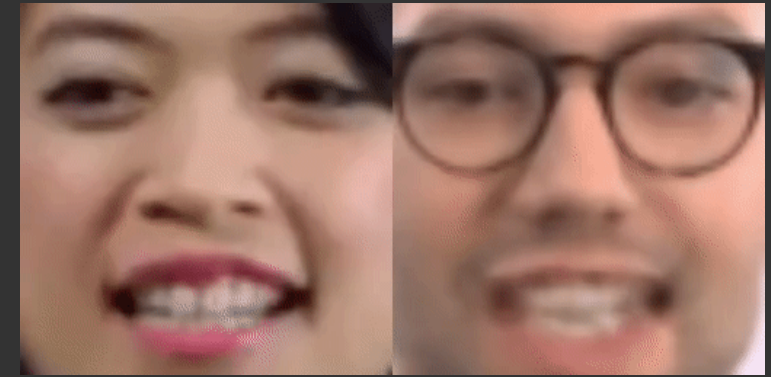
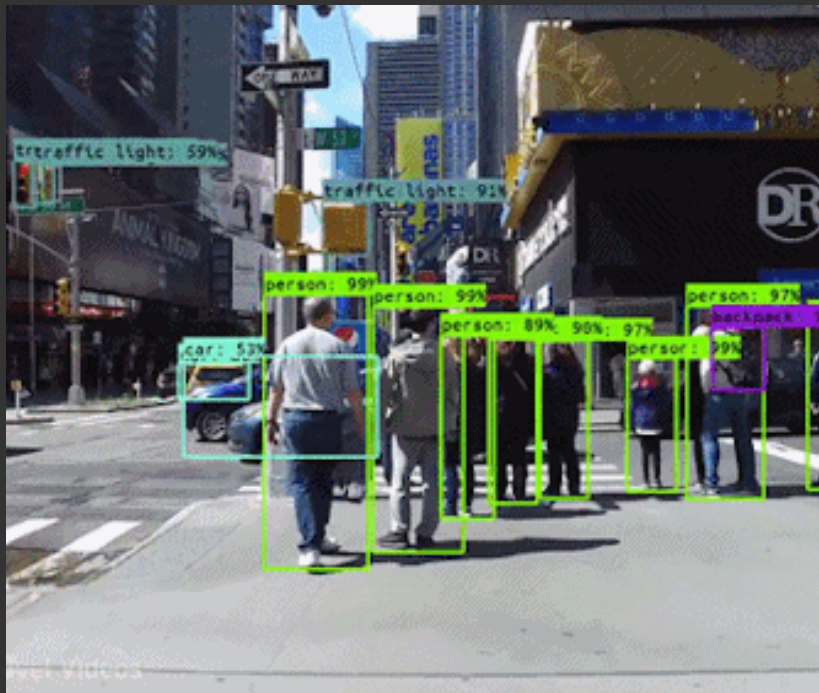
- 1950 Turing predicted that in about fifty years “an average interrogator will not have more than a 70 percent chance of making the right identification after five minutes of questioning”.
- 1957 Newell and Simon predicted that “Within ten years a computer will be the world's chess champion, unless the rules bar it from competition.”
- 1965. H. A. Simon: “machines will be capable, within twenty years, of doing any work a man can do.”
- 1967 Marvin Minsky: “Within a generation ... the problem of creating 'artificial intelligence' will substantially be solved.”[60]
- 1970 Marvin Minsky (in Life Magazine): “In from three to eight years we will have a machine with the general intelligence of an average human being.”

Why Did They Get it Wrong?

- **They failed to understand at least three key things:**
 - Scalability and the problem of complexity and exponential growth
 - The limitation of computing power
 - The need for knowledge (lots of it)



Neural Network: a new hype or a new hope?



...k is no longer access to information; now it's our ability to
...ned on a variety of different types of texts and summary
...can generate long, coherent, and meaningful summaries
...blem.

...nessed a fundamental change in the challenge of taking in new information. The bottleneck is no
...We all have to read more and more to keep up-to-date with our jobs, the news, and social media
...ing with this information deluge and one potential answer is to have algorithms automatically sur
...t, coherent, and meaningful summaries remains an open research problem. In fact, generating a
...deep learning algorithms. In order to make summarization successful, we introduce two sep
...odel and a new way of training summarization models via reinforcement learning (RL). The co
...o create relevant and highly readable multi-sentence summaries of long text, such as news artic
...m can be trained on a variety of different types of texts and summary lengths. In this blog
...an overview of the natural language challenges specific to text summarization.

Handwriting
Handwriting
Handwriting

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beautiful.ai

AI - Human level performance milestones

1 2016: Object classification ImageNet

The error rate of automatic labeling of ImageNet declined from 28% in 2010 to less than 3%. Human performance is about 5%.

2 2017: Skin Cancer Classification

An AI system, which was trained on a data set of 129,450 clinical images of 2,032 different diseases, performed comparably to board-certified dermatologists.

3 2017: Speech Recognition on Switchboard

In 2017, Microsoft and IBM both achieved performance within close range of “human-parity” speech recognition in the limited Switchboard domain

4 2018: Chinese English Translation

A Microsoft machine translation system achieved human-level quality and accuracy when translating news stories from Chinese to English.

AI - Human level performance milestones

- **2018: Dota 2**

OpenAI Five, OpenAI's team of five neural networks, defeats amateur human teams at Dota 2

- **2019: Alphafold**

DeepMind developed Alphafold that uses vast amount of geometric sequence data to predict the 3D structure of protein at an unparalleled level of accuracy than before.

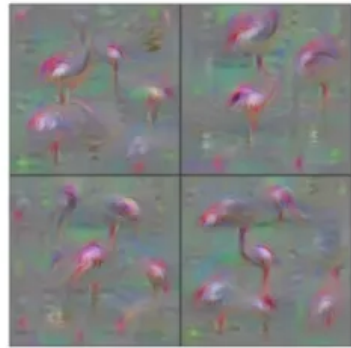
- **2019: AlphaStar**

DeepMind developed Alphastar to beat a top professional player in Starcraft II.

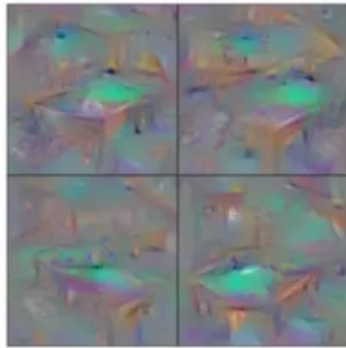
- **2019: Detect diabetic retinopathy (DR) with specialist-level accuracy**

One of the largest clinical validation of a deep learning algorithm with significantly higher accuracy than specialists.

Is AI moving too fast?



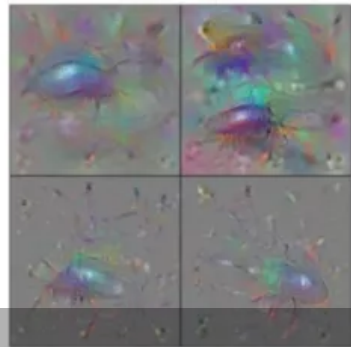
Flamingo



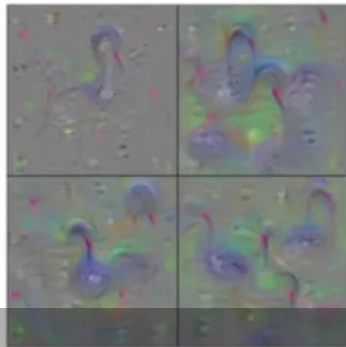
Billiard Table



School Bus



Ground Beetle



Black Swan



Tricycle

IMAGES PRODUCED IN 2015



redshank

volcano

monastery

IMAGES PRODUCED IN 2016



Thank You