MARKETING and AI

Tools and case studies

SOMMARIO

Artificial Intelligence: Past, Present and Future

AI and Marketing: evolution 2000-Now

AI and Marketing: Main tools and New features

Paolo Marocco

Short CV

- Master's degree applied mathematics and computation, University of Genoa
- Master in Neural network and psychology, University of Rome 'La Sapienza'.
- Phd Economics (XXXI cycle) University of Genoa. Thesis title: "Essays in economics of platforms"

- Temporary researcher at Univ di Roma2 Tor Vergata and DISEFIN Univ of Genoa
- Author of 10+ papers AI computational linguistic: ML, DL e NLP
- Author of 3 papers Economics
- Data Scientist in Content Analytics, Modelling and Optimization – MASSIVE DATA HEIGHTS Inc.

https://www.linkedin.com/in/paolo-marocco/

Artificial Intelligence: Past and Present

From Expert System to Deep Learning:

An overview

A short history: the origin

‘50-’60

- The father of Artificial Intelligence is John McCarthy, a prominent computer scientist and cognitive scientist (he was the inventor of Lisp language: the first programming code used in robotics).
- McCarthy presented his definition of Artificial Intelligence at a conference on Dartmouth College in the summer of 1956 indicating the beginning of AI research.
- the theoretical goal was very ambitious: simulate the whole human intelligence. But the practical results much less: at the beginning, was reduced to Two simple tasks:
    - **Problem Solving** (e.g.: techniques for find a solution of logical games, puzzle, crossword puzzle and so forth)
    - **Graph Navigation** (e.g: finding the shortest path to connect the Node A with the node B. Practically the Google map suggestion: “I’m in via Veneto (RM), and I search the closest tube station connecting to Ostiense to reach the first train directed to Ostia”).

A short history: a relevant milestone, the Expert Systems

'60-'80

- The Expert Systems (or Knowledge Representation Systems) challenge was to simulate the knowledge of human experts concerning different application fields: e.g. the production chain of vacuum pump, the packaging of a box, an algebraic equation and so forth.
- The theoretical perspective didn't match very well to realistic problems, in particular when there are several and not deterministic decisions to take. An example of the Expert System logics (coming back to the previous example of the passenger) is:
  - If <user A> to miss <train B> then <user A> to wait < next train>
    - The system had the possibility to recognize:
      - A lexicon of entities : A, B, …
      - A set of actions : miss, wait, …
      - Some Inferential rules simulate the process: *An action applied to some entities triggered a consequence (e.g.: another action or a stopping)*

Expert Systems constraints

Rigid rules, static and not able to prevent new situation

- New requirement needs a new rule.
- Although continuously adding new rules, the new problems to solve overpass the system knowledge.
- It was necessary to get your hands dirty, for arranging unpredicted situation.

A short history: the revolution of Machine Learning

‘90-’00

- To overpass the rigid constraints of Expert Systems, the new generation tools change the engine. Statistical learning models was born, able to capture endogenous insight of a generic problem, reacting with a solution more flexible and generalized.
- Basically, the farraginous blocks of pre-defined rules are removed and replace with an automatic mechanism, that observes the statistical proprieties of the features, and take decision based on the ability to recognize statistical relationships. Briefly there are two main classes of systems:
  - **Supervised System**: The training set (that is the set of samples) is chosen by human (e.g.: Classifier, Sentiment Analyzer, Automatic translator) .
  - **Unsupervised System**: It is the algorithm that takes the decision, observing the internal characteristic of probability distributions (e.g.: Clustering, name-entity recognition, …)

A short history: from Machine Learning (ML) to Deep Learning (DL)

‘10-’20

- In the last decade, the AI improvements is very affected by Deep learning Network. What does it mean:
  - For DL we refer to Networks provided by high number of layers (roughly, deep mechanism to learn the convergence of the expected result) .
  - The DL networks coupled with cloud computing system had the possibility to run over millions (or billions of numbers or texts: Big data), then to face towards very complex problems.
  - In the next Page we show the two big branches of Deep Learning, both affecting marketing deals:
    - Computer Vision (concerning visual pattern: images and videos)
    - Natural language Processing (that is the learning of text or voice-to-text)

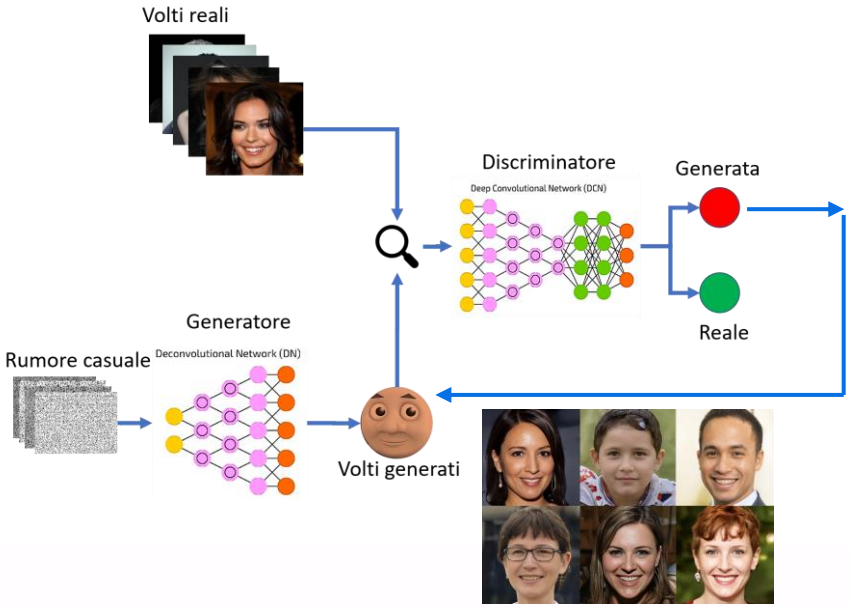
Computer Vision

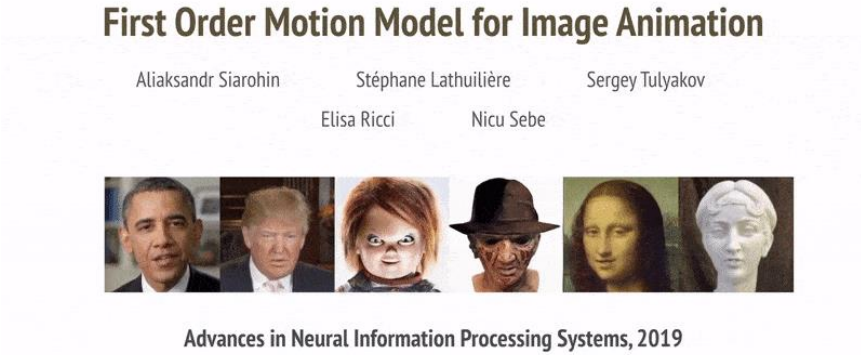
GAN (Generative Adversarial Network)
Jan Goodfellow, 2014

The network generate new images learning by previous sample and random patterns: the new image can be fully invented or adjusted of real images.

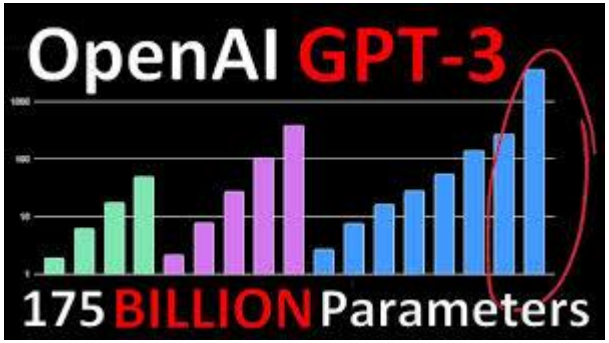
Examples:

- Face App (Fb 2018) modify the Faces, old/young … man/woman
- The artwork Bellamy generated by GAN and sold at 430.000 $ at Christie's auction NY
- Fake Faces: ThisPersonDoesNotExist.com





NLP
Natural Language Processing



GPT-3 Generative Pretrained Transformer (June 2020)
OpenAI (company founded by Elon Musk + Microsoft)

Model's characteristics:

- It is trained through a Corpus of 400+ billion of pages, using 175 billion of parameters (roughly corresponding to the number of synapses. *The human brain has 100,000 billion of this unit*)
- The learning is completely unsupervised. That is the human setting is outside, the Network is able to self-learning through the billion of information that it has ingested.
- **NOTE**: All the structured learning: the grammar, and the morpho-syntactic properties too, are not inserted, but the statistical models are able to recognize e understand the basic relation of language's logic: Subject-Verb-Object .
- Some examples of the model capabilities:
  Es. *Task*: «Next word in a sentence» Input: the sentence Output: the next word (predicted)
  - *Task*: Question/Answer Input: «What is the capital of Spain? Output: Madrid
  - *Task*: Translation (Eng to Fr,It) Input: peppermint Output (Fr): menthe poivrée Output (It): menta piperita
  - *Task*: 3-digit math operation Input: (125*34) –15 Output: 4235 (**Note**: without pushing rules, the model built the rules from samples)

Marketing Impact of DL (present and future)

Computer Vision

The technology uses AI to scan images and identify objects and components within them (see next page for examples).

- For instance, when Facebook recognizes a friend's face in your photo and asks, "Do you want to tag [name]?"
- Instagram uses the technology to apply filters, to recognize parts of the face like eyes, lips, jawline and nose, and augmented reality (AR) to modify these in real time, like adding a puppy face or branded image.
- For example, Visual Search (not yet deeply adopted) can help customers browse, compare, and narrow their choices through image-generated similarities

We'll see this case in detail in the next pages.

Marketing Impact of DL (future)

Computer Vision

Image Caption/Segmentation

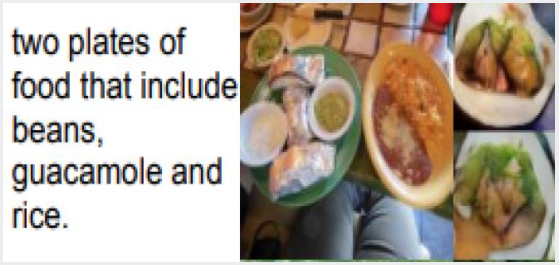
- The image is decomposed and split in the meaningful parts (semantically independent)
- It is used in Social Network applications and Mobile Cameras

Real Caption : lone man climbing high on snowy mountain.
Greedy Search : man is standing on top of glacier.(BLEU :53.45)
Beam Search(b=3): man is standing on top of glacier.(BLEU : 60.30
Beam Search(b=7): man is standing in the snow(BLEU : 66.66)
Beam Search(b=10): a man is standing on a glacier(BLEU : 53.45)

Observation : Beam Search(b=7) is more meaningful here.

Text to Image (Text Captioning)

- The reversed process: from a text -> the images generated (noted: NOT chosen) corresponding to the Text



Marketing Impact of DL (present)

Natural Language Processing

We get a look on the more important applications of ML and DL adopted by the Marketing:

- «Topic Extraction» e «Summary Extraction», that is the extraction of key points from a text (e.g.: the main features or a summary of a product) in order to launch marketing campaign in automatic way (e.g.. Twitter and Instagram campaign).
- «Sentiment Analysis» is a tool for learning the polarity of a message/post (Positive/Neutral/Negative). Adopted in the marketing campaigns because it offers a quick learning of the consumer perception and behavioral about his/her preferences.
- «Automatic Translation». In theory, using the automatic translator, it is possible to cover multilanguage campaign. In practical way only the new generation of systems offers the capability to align the messages in different languages, in order to maintains a correct use of the translation.
- «Automatic Text Generation» is a new frontier. It generates new text (not only articles, news but also novels and poems, learning by literature, and assembling in not trivial way, but in original way like human creative attitude. GPT-3, shown before, is a Text generation models.

Marketing Impact of DL (future)

Natural Language Processing

The number of NLP scientific papers in the two last years (2019-20) is equal to the previous 20 years (~ 2700). What does it mean:

- The most important papers are provided by the big digital companies, more than the best papers proposed by academic people and gov. institutions.
- Google Brain and Google Mind (Google-Alphabet corp.), OpenAI (Elon Musk), Amazon AIS of Amazon, Allen Institute of Paul Allen (co-founder Microsoft) and others : They lead and control the vast majority of On-line service, receiving billion dollars of financing.
- The result of this oligopoly is simple to understand: The DL algorithm will modify the panorama of the future. Not necessarily destroying the small companies and the inventors but centralizing the Big business.

New frontiers of DL (future)

Computer Vision meets NLP: Next marketing application?

DALL·E: Creating Images from Text (https://openai.com/blog/dall-e/)

The model is trained to generate images from text descriptions. Not only, changing the textual attributes (or generating new ones) the model transforms text to new images, compliant to the description.

Text prompt: *an armchair similar to an avocado, an armchair imitating an avocado, give me different examples of this picture…*

Results : ----------→

AI and Marketing: evolution 2000-

For occasional to structured adoption

AI and Marketing: timelines

End 90-firsts 2000

- In the first years of 2000, Google launches Ad-words (Ads) and 3 years after another marketing tool: Ad-sense. They are the first Machine Learning techniques able to capture the relationship between keywords and context:
    - The Ads auctions give the possibility to sell kwds that, when used in a query, can capture matching result in sponsored links .
    - The Ad-sense permit the best visualization of a banner inside page context of the same argument.

CASE STUDY: In 1996 Amazon retailer launches a new system for suggesting new books to users, candidate to match their taste. The system is based on “collaborative filtering” algorithm, for the first time adopted in the Web business. Practically: if user *A* buys the books b1, b2, b3 and user *B* the books b2, b3, then *C*, who has bought b2 can be interested on b3. It is a new Web era: The first Online recommending system was born.

BY USING THIS BUSINESS MODEL, GOOGLE LAUNCHED THE NEW DIGITAL ECONOMY, WITHOUT SELLING GOODS, BUT CREATING THE BEST MATCHING DEMAND/SUPPLY. AFTER 20 YEARS, THE WEALTH OF GOOGLE REACHES 1 TRILLION OF $.

AI and Marketing: timelines

2000-2010

- In these years, the Social Network and the Smartphones change the behavior of the consumers. The time spent to navigate grows up immediately: The Fb apps followed by the mobile apps arises on the screen.
- BOOM of Adv system, and improvement of tools for optimizing the target profiling: the matching between the information uploaded and the banners.
- The Virtual Reality was born: a phenomenon that seems to promise a new marketing revolution (in particular applied to the apps) but Nothing shocking the scenario.

CASE STUDY (A DEFAULT): Second Life

Second life is a virtual reality world that 15 years ago seemed to became a marketing revolution. Although the tools to crate and manipulate objects was very rude and not intuitive, a lot of companies, in Italy and in the world, invested moneys for positioning their brand and participate to the engagements with the (virtual) customers. Even the Linden dollars, the currency of this world, appeared to be destined to became something like the current Bitcoin.

Now Second life has almost disappeared

AI and Marketing: NOW

The Artificial Intelligence impact today on different sectors of marketing!

Applicative areas

Applications of NLP for marketing

- Consumer Analytics
- Pricing Optimization
- Programmatic ADV
- Social media engagements
- Marketing Channel Analytics

See https://research.aimultiple.com/marketing-ai/

AI and Marketing: A new era?

The new tendences of marketing

SEO vs. SEM are the more used tools: What Is The Difference?

- Search Engine Optimization (SEO) is an essential tactic for brands that want to drive website traffic and grow their online visibility (on Google and other Search Engines). Basically, it is composed by several techniques oriented to improve the matching with the SERP (Search Engine results pages).

- Search Engine Marketing (SEM) is a strategy using paid tactics to gain visibility on the Search Engines or Social Network. It is also known as PPC (pay-per-click). Basically, you buy Keyword research (more correctly: participate to Auctions) to create targeted campaigns based on this kwds (e.g.: kwds used in Google query, in Post Facebooks and so forth). These campaigns promotes these Kwds in sponsored links.

- SEO and SEM improve the visibility of your website, driving an amount of traffic and user engagements: More people have land on your site! But:
  - With SEM, an advertiser pays every single time the user makes a click on an ADV-Banner (The game is optimizing the cost of all clicks with respect the result: Buy a good!): It is an immediate result .
  - With SEO you improve the quality content and the structure of your Web site. You reach a Cumulative result: day by day.

Digital Marketing of next years

SEO vs. SEM: A look to the future…

- SEO professionals are now required to become storytellers. The digital message must meet the user's mindset and intent and deliver what the searcher is seeking while building brand awareness in the long term. The needs are more sophisticated than the past:
  - Question the user experience.
  - Evaluate the target audience.
  - Consider how websites are optimized and connected with Social Networks, Apps and other services.
  - Consider the language and visuals used to connect with audiences
  - Innovation with technology: e.g.: Augmented reality , Natural language Processing and so forth.

- SEM increases in ways we can automate search engine marketing. From reporting, bidding, to automatic ad creation, search engine marketing channels approaches to new tools
  - Voice and Visual searches (see pgg. 33-)
  - Shop by Search (reduce the time between search click and purchase)
  - Predictive analytics and matching better the needs of target customers
  - Improve the links between SEM and SEO. E.g.: Banner clicked informs SEO of the most relevant keywords to target for organic ranking. Seo professionals create a storytelling around these kwds.

Natural Language Generation and Marketing

How Natural Language Generation Can Help Your Digital Marketing

We have seen before how the Natural Language Generation can boost automatic storytelling. Now we draft How it affects Digital Marketing:

- Supposing you regularly employ a team to identify keywords, perform SEO, create product descriptions, and analyze marketing data. With natural language generation, you can automate all these tasks:
  - Regularly automatically producing fresh content that speaks to the customers: blog post, Web pages, reports, …
  - Generate dynamic product description, customized for a target audience (Currently, most of the product information are statics, they do not change by adapting to the user. In the future the AI will offers this personalization).
  - A subject line generation in e-mail marketing, in order to create a Wow effect!
  - SEO optimization adding meta-description page generation and other features best integrate in the Web page experience.

Target profiling and Marketing

Customer Personas Can Transform Content Marketing

What is "Customer Personas" ?

- on March 11, 2020, the World Health Organization (WHO) declared that COVID-19 was a global pandemic, and all of strategies for boosting brand awareness, increasing website traffic, etc. were knocked. Two Industries hit hardest by pandemic:
  - Travel
  - Automotive
- Digital marketers discovered that the biggest challenge was adjusting to changing customer behavior, which was shifting rapidly and unpredictably amid the coronavirus pandemic.
- For example, The target audience must become more granular and focused: Customer Personas, like female college students in urban areas" can be split more granularly: traditional undergraduate students, untraditional students, international students, first-generation college students, transfer students, online students, …
- Each of these sub-categories change the purchasing behavior quickly, pushed by a strong discontinuity like global pandemic.

Target profiling and Marketing

Customer Personas Can Transform Content Marketing (2)

"Acting on consumer intent is one of the keys to unlocking growth": the marketers has set six "canonical" consumer needs, where each one was made up of a different combination of emotional, social and functional needs. A tracking tool can target the people, digesting this information (by Mobile paths, Google Search, Social network stories and so forth) and activating strategic content marketing, reacting to unpredictable status change.

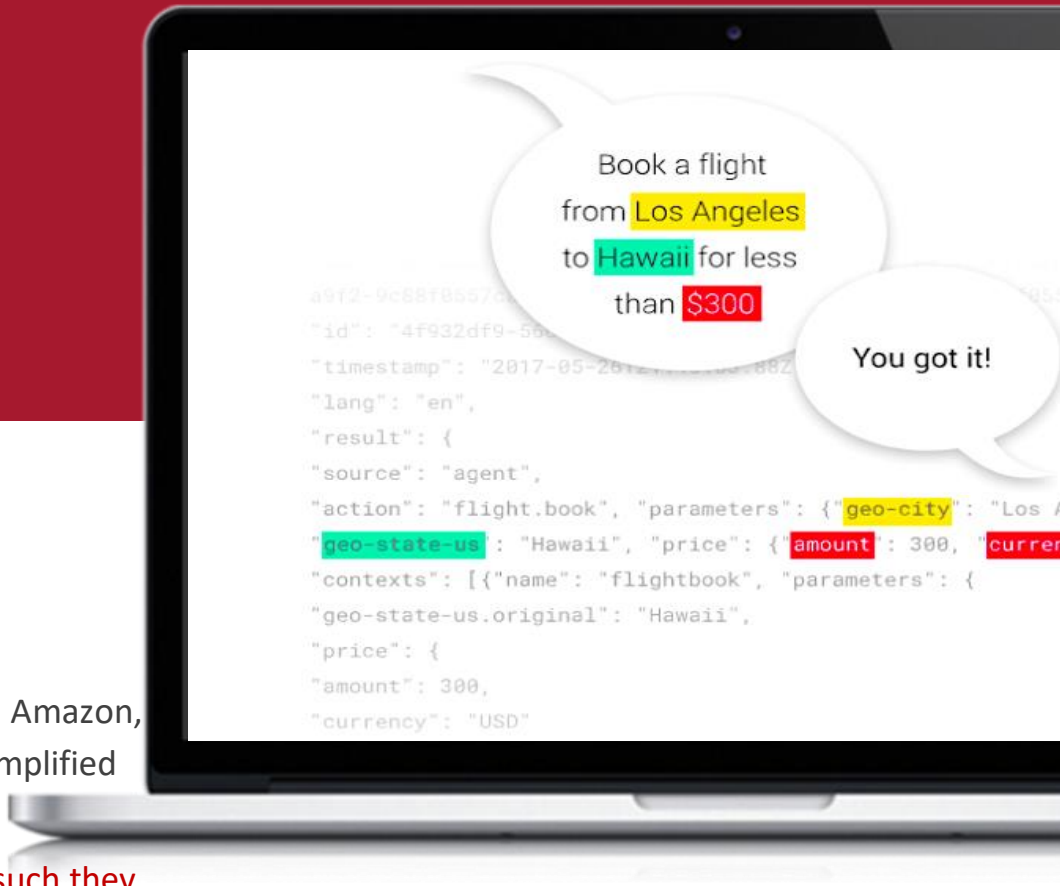
- Surprise Me: Search is fun and entertaining. It is extensive with many unique iterations.
- Thrill Me: Search is a quick adventure to find new things. It is brief, with just a few words and minimal back-button use.
- Impress Me: Search is about influencing and winning. It is laser-focused, using specific phrases.
- Educate Me: Search is about competence and control. It is thorough (reviews, ratings, comparisons, etc.).
- Reassure Me: Search is about simplicity, comfort, and trust. It is uncomplicated and more likely to include questions.
- Help Me: Search is about connecting and practicality. It is to-the-po-the-point, and more likely to mention family or location.

VPA + Smart Speaker

Virtual Personal Assistant (VPA)

All the Big Digital companies (Google, Apple, Microsoft, Amazon, …) provide a VPA, in order to aid the user involved in simplified daily occupations.

The VPA business also involves smart marketing tools, such they used by Amazon Alexa

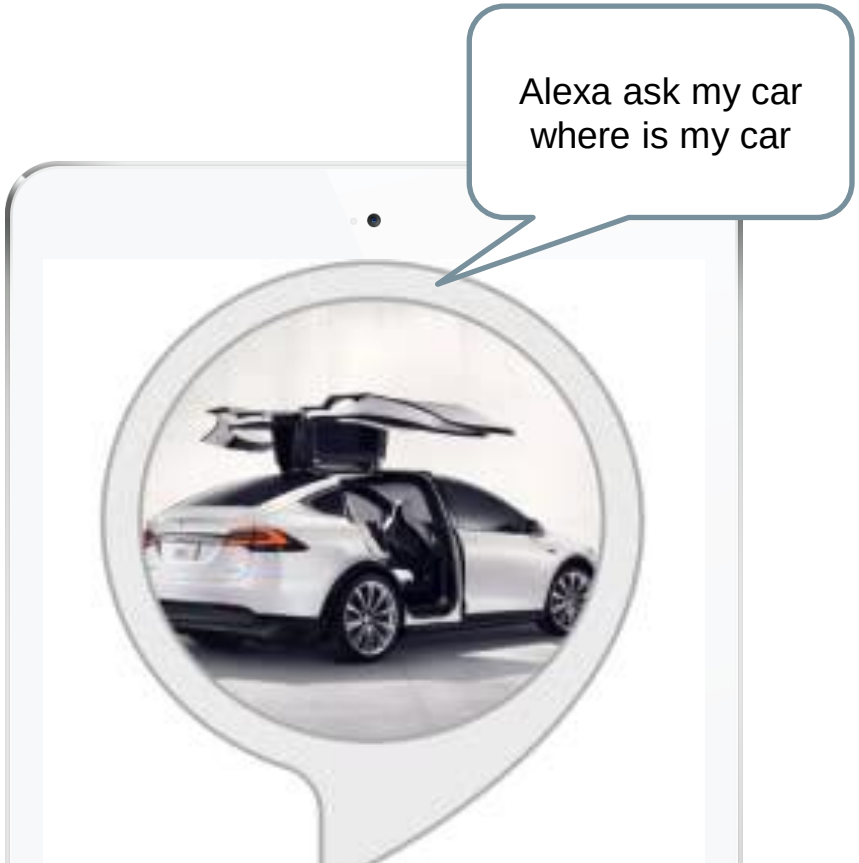


Alexa-Echo

Alexa tools

- Alexa-Echo not only is useful for Question/Answering or control domotic intelligent devices, but it can order products on Amazon Marketplace.
- It is able to connect more intelligent devices (also belonging to different brands) through Alexa API mechanism: this commercial intuition creates a spillover effects around several suppliers, whose devices are designed compliant to Alexa standard of communication.
- For example, Alexa Skill is an Add-On library that customizes the communication among Alexa and different classes of devices (lamps, boilers, TV, appliances, ...)
- Alexa marketing Stack is the controller of the Alexa functions for optimizing its performance, to increase the business with the affiliate companies that support its standard.

Alexa skill example: My Tesla



his skill allows you to get information about your Tesla car. You can get charge status, location & climate status. You can also control your car - flash lights, honk, start/stop charging...

Integration Tesla car lock with Alexa

Alexa can talk directly with the Tesla model, like a Personal Assistant.

The are other apps Tesla-compatible like this, but the Uniqueness of Alexa app is the capability of Amazon to integrate this tools within the other resources: the Marketplace and the Marketing Stack.

Alexa skill example : Our Groceries

OurGroceries automatically keeps your family’s grocery list in sync with the latest changes (deliveries of al Supermarket connected with the app «Our Groceries»)

Integration Our Groceries con Alexa

Alexa is interfaced directly with this service: if it controls a fridge, can verify the supply of milk and act accordingly. For intelligent warehouse of shops (e.g.: pizzeria or cafe) it can provide an automatic communication about products request.

A new way to find products:
snap->find->buy

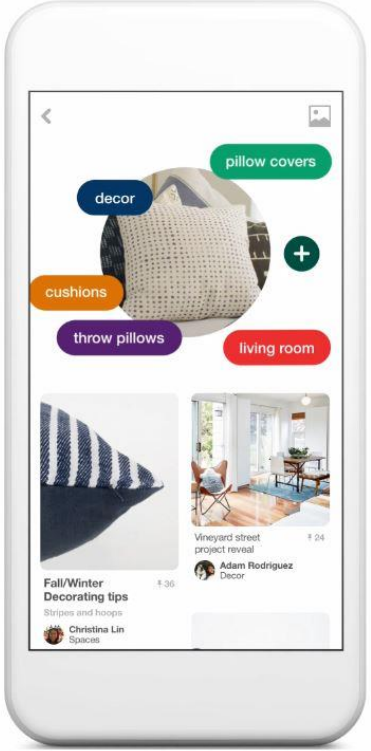
Visual Search

How can I find a purse, if I don’t know the product name, but I can only describe my taste and preference?

Visual Search

Text Search vs Visual Search

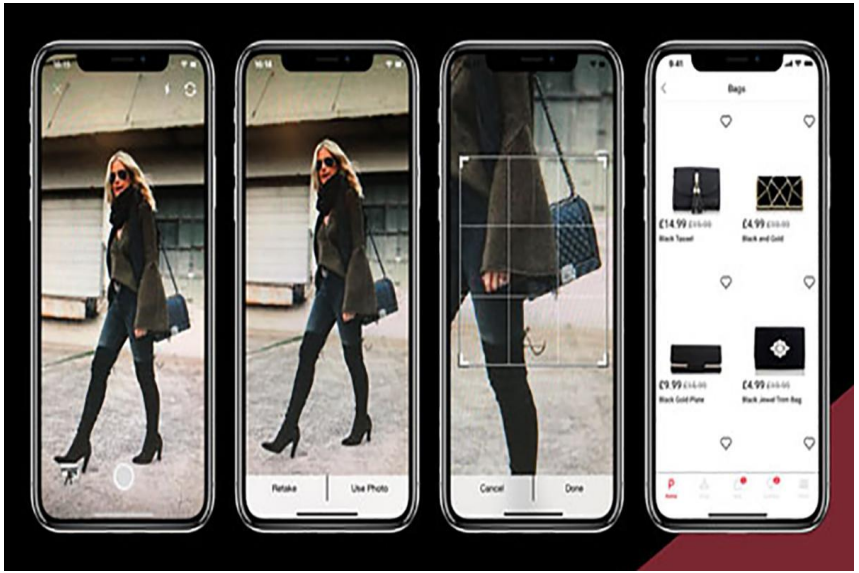
- The strong problem of Text/Voice search is the weakness in specify complex goods, such as a piece of clothing, an aggregation of goods like the furnishing of an apartment and similar
- The Ideal tool is snap a picture and ask to the system to find similar objects available in the e-commerce site. This is called Visual Search query: due to the reduction of time in “Search and Buy” in mobile shopping service the opportunities are clear.
- There are similar services of Visual Search:
  - Google lens
  - Pinterest lens
  - Amazon Image Search
  - (SN tools) Facebook Messenger API
  - (Web) Bing Visual Search and Google Cloud Vision API



Visual Search

The Marketing advantages

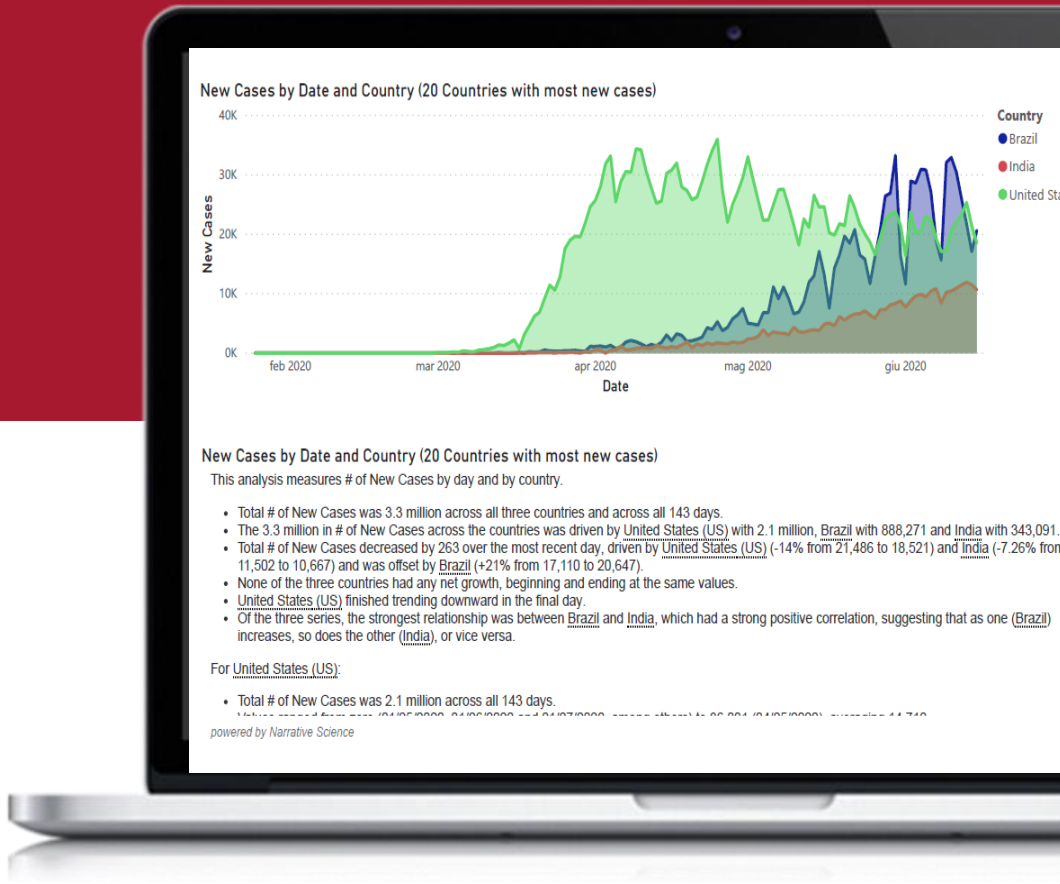
- If it is adopted for e-commerce purposes, users have been taking advantage of it to purchase more, otherwise if it is used for searching an images it encourages the people's engagement.
- It can provide a more generalized recommending system, because the matching is not only by text of similar products, but also by similar pictures.
- It facilitates the connection with Advertisers and Banner.
- It seems to have a natural integration with chatbots. chatbots would be particularly useful at helping direct users to the proper pages during pre-sale shopping, as well as post-sale troubleshooting. Allowing users to use images here and not just text, that often is ambiguous and complicate to communicate.



Automatic Chart Explanation

The tool permits to read the values and the slopes of charts. After this learning it can translate the behavior of curves putting into relevance the critical points and the strengths.

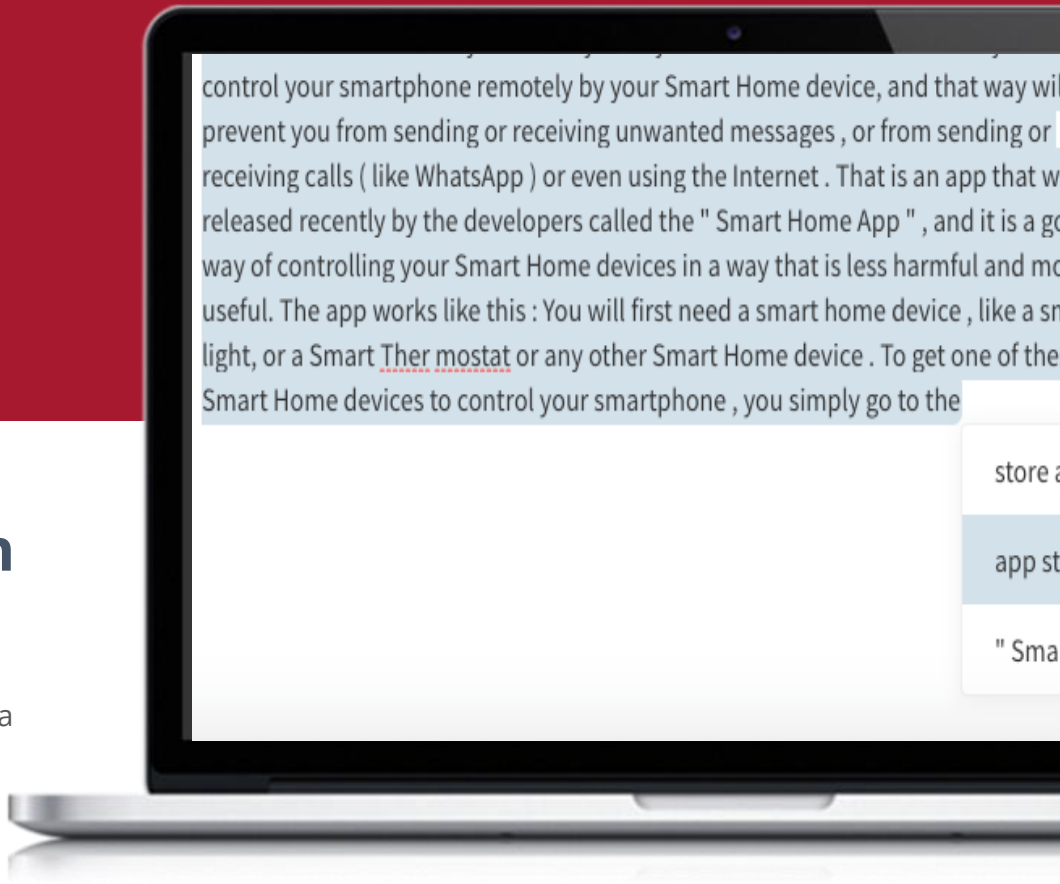
It may be seen like an instrument for Marketing Analytics



NLG content generation

It can generate text banner, meta-description web page and messages useful for automatic ADV campaigns , learning by a wide training set of textual information.

It’s very useful when the company want generate thousands of message/post in few time.



Thanks

paolo.marocco@massivedh.com