

# Inteligência Artificial (IA)

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## Leitura pré-aula

<http://slideplayer.com/slide/8370515/>

“Are We There Yet? On Creating Intelligent  
Behaviour”

Nello Cristianini

University of Bristol

# Metáforas

Ernesto Costa e Anabela Simões, Inteligência Artificial, 2004

**Computacional** Newell e Simon, 1976

Inteligência= Processos+Estruturas Simbólicas

**Conexionista** McCullough e Pitts, 1943

Inteligência- propriedade emergente nas interacções de um número elevado de unidades elementares de processamento

**Biológica** Holland, 1975

Analogia com processos biológicos: algoritmos e programação genética; programação evolucionária

# Ferramentas de IA

Sistemas periciais

Redes neurais

Algoritmos genéticos

Reconhecimento de padrões

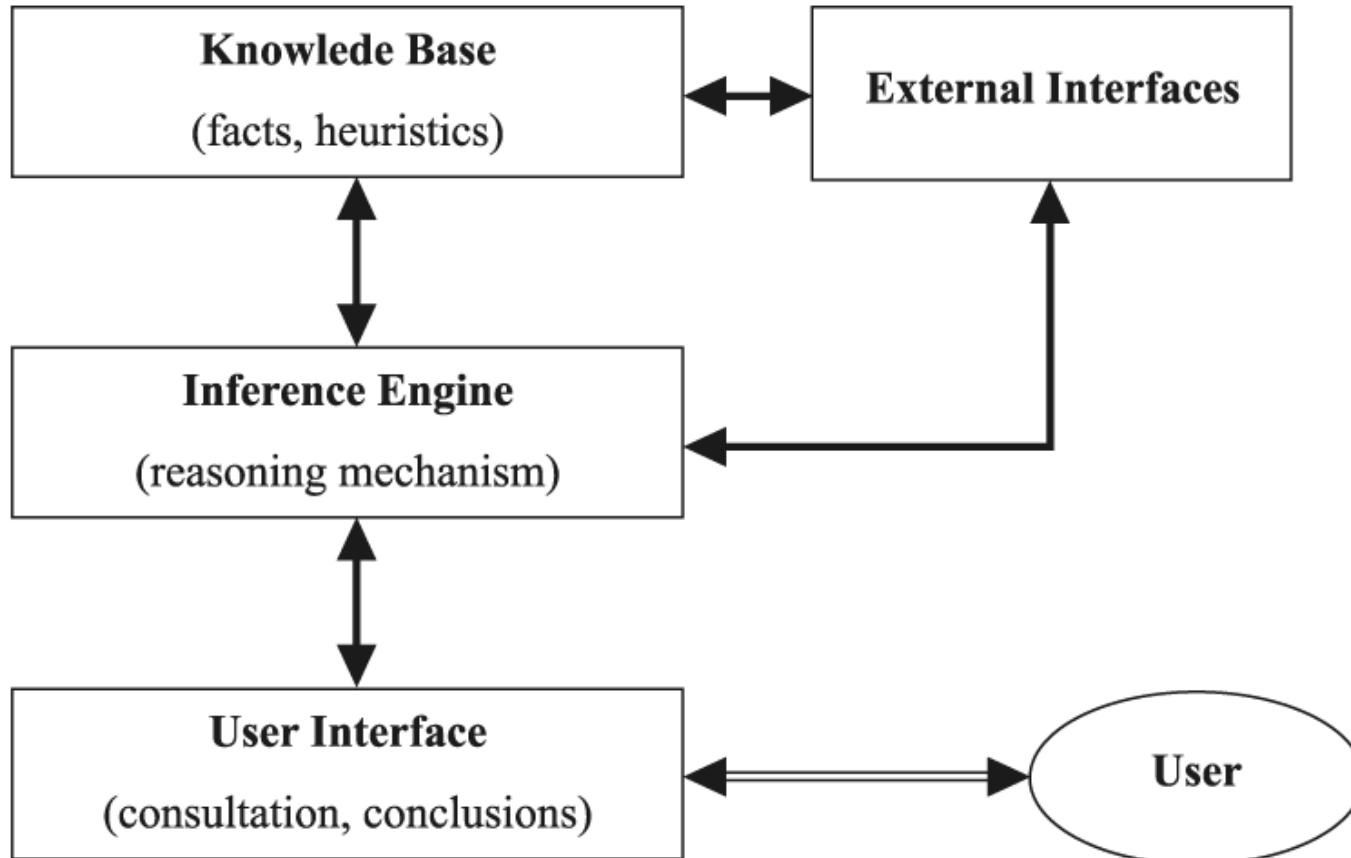
Modelação baseada em agentes

Chat bots

IA generativa

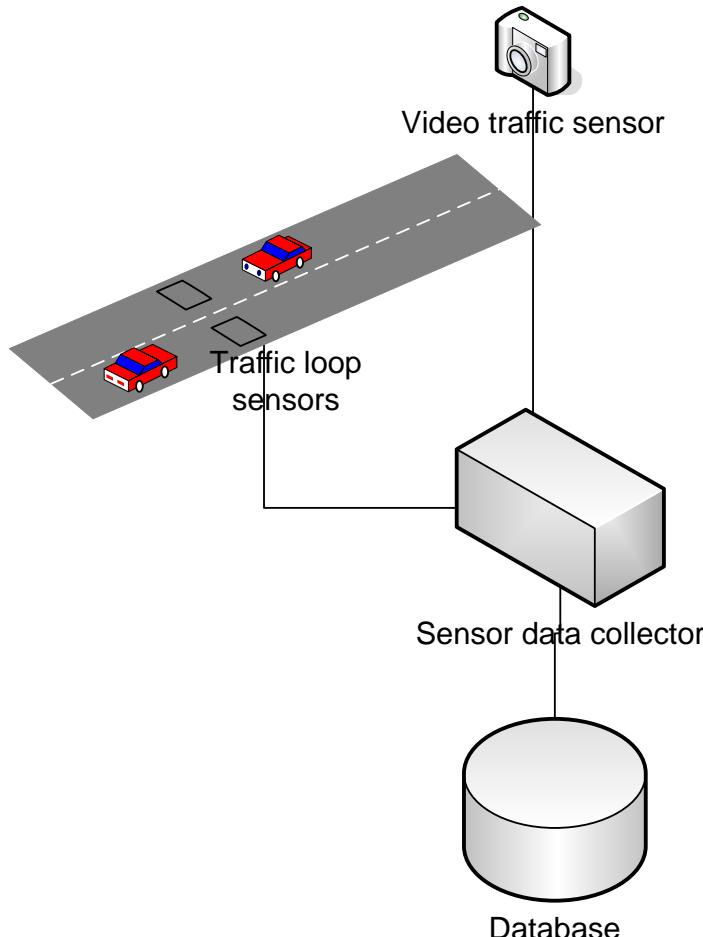
# Sistemas periciais

Dendral, Mycin, Prospector et al.



# Redes neurais

## m-Traffic



Recolhe as informação dos sensores  
Velocidade média  
Intensidade de tráfego

Independente do tipo de sensores  
Sensores de chão  
Sensores de video

Classifica a informação recolhida  
Hora  
Dia da semana  
Dia do mês  
Mês  
Feriados  
Variáveis meteorológicas

# Redes neurais

m-Traffic

Aplicação de algoritmos de inteligência artificial

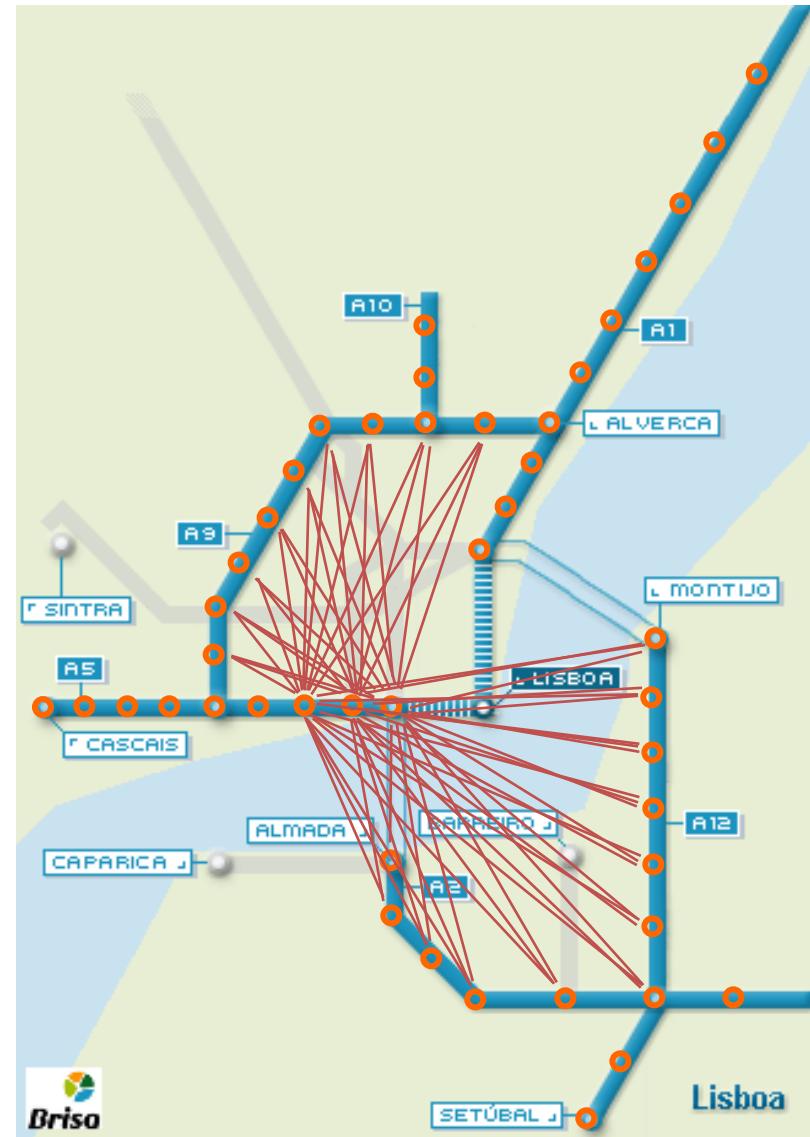
Usa a informação recolhida no passado

Infere as relações entre a intensidade do tráfego  
nos vários pontos ao longo do tempo

# Redes neurais

## m-Traffic

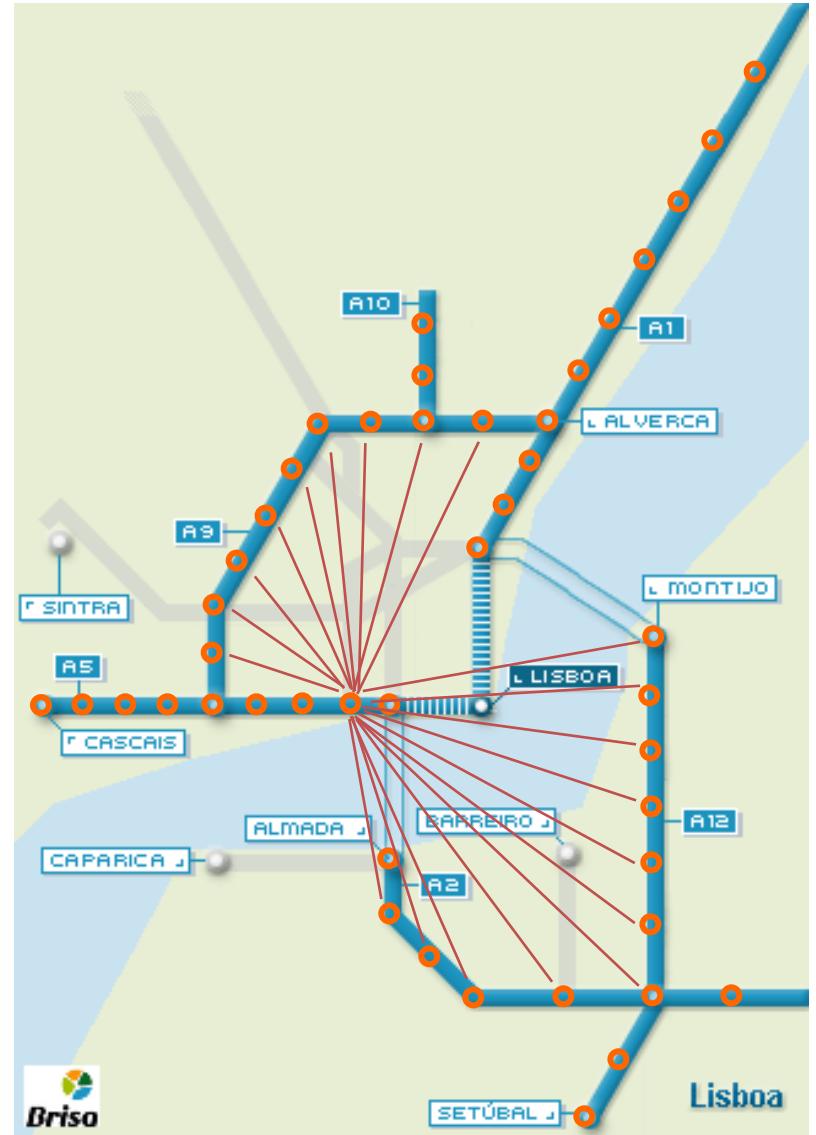
- Rede de sensores
- Aprendizagem
  - Feita periodicamente
  - Relaciona valores de cada sensor com todos os outros, desfasados no tempo
    - 5 minutos
    - 10 minutos
    - 20 minutos
  - Inclui classificação
    - Hora
    - Dia da semana
    - Dia do mês
    - Mês
    - Feriados
    - Variáveis meteorológicas



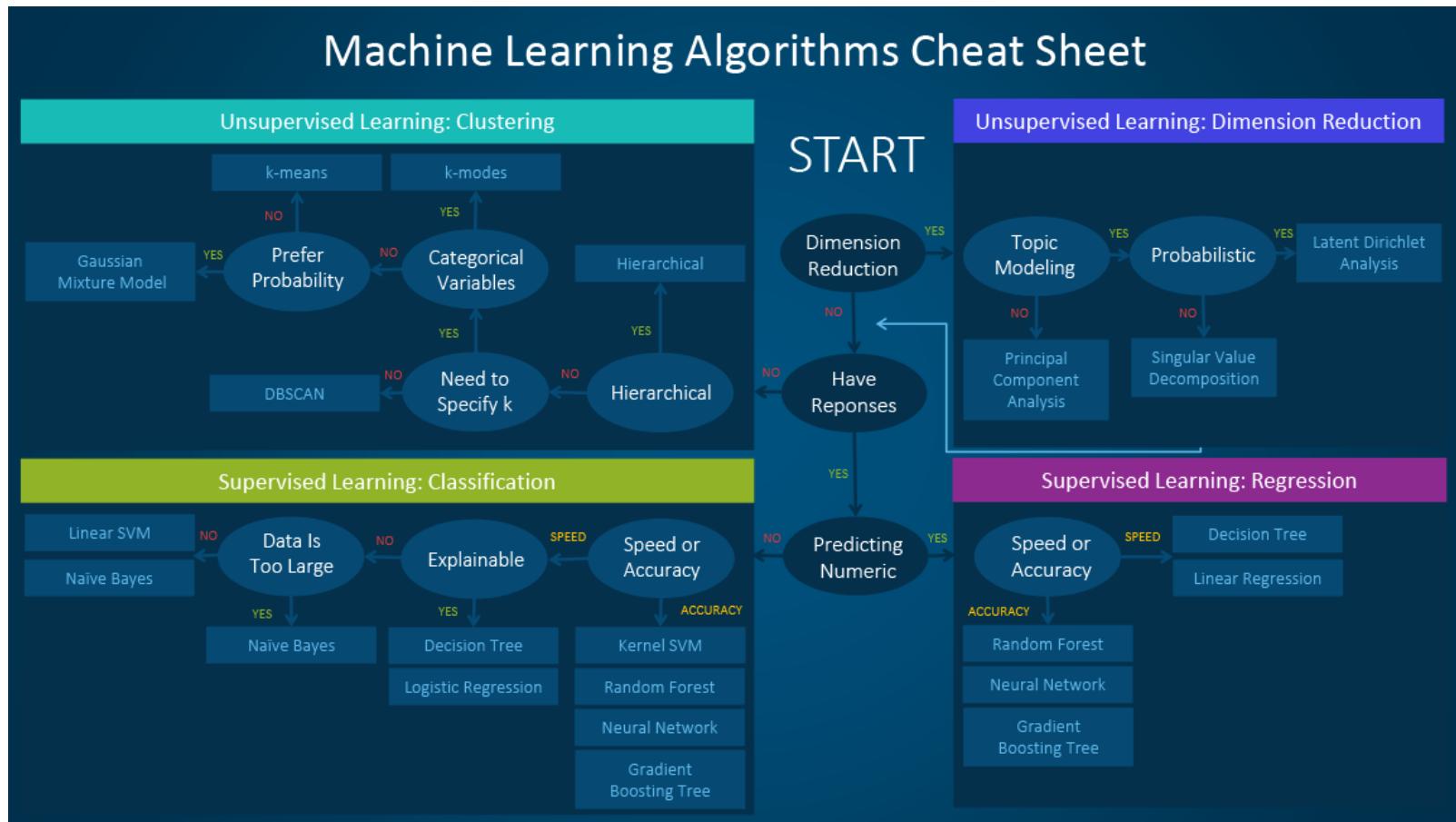
# Redes neurais

m-Traffic

- Dada a informação num dado momento é possível prever a intensidade do trânsito em cada ponto daí a:
  - 5 minutos
  - 10 minutos
  - 20 minutos



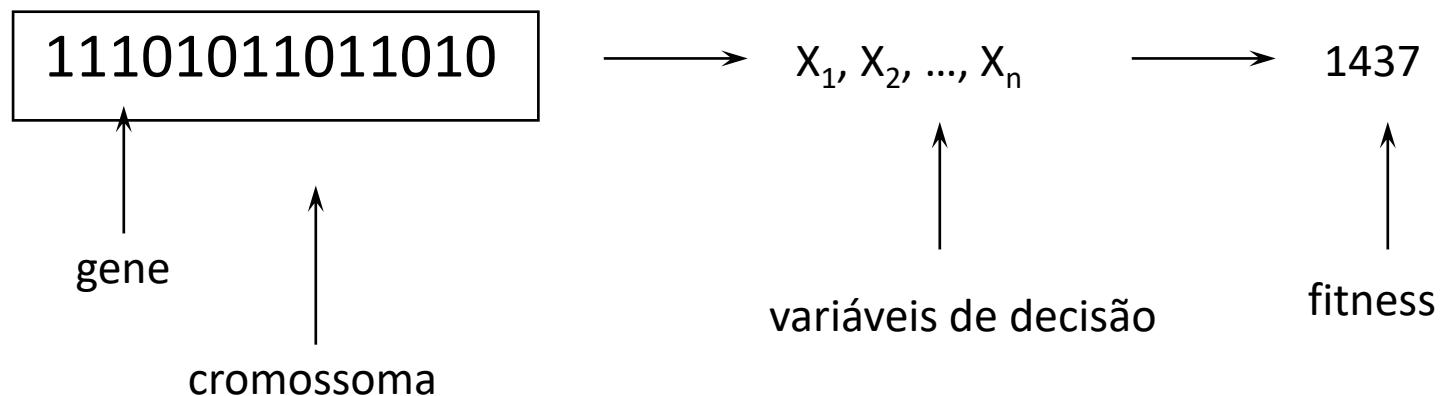
# Redes neurais



<https://tinyurl.com/y8jjajko>

<https://www.coursera.org/learn/neural-networks-deep-learning>

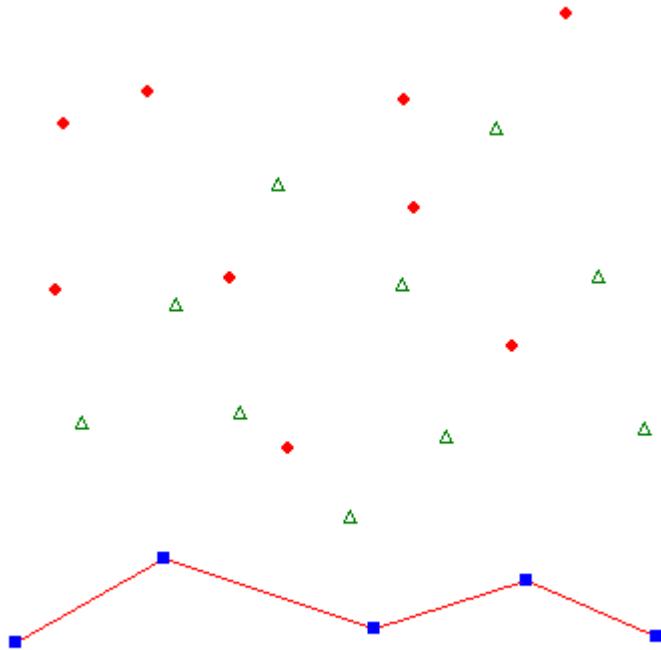
# Algoritmos genéticos



# Algoritmos genéticos

1. Inicializar aleatoriamente uma população com  $N$  indíviduos
2. Calcular fitness de todos os indíviduos da população
3. Criar uma nova população através do operador de selecção
4. Efectuar “crossing-over” entre cada par de indíviduos
5. Efectuar mutação em cada gene, com probabilidade  $Pm$
6. Voltar ao passo 2

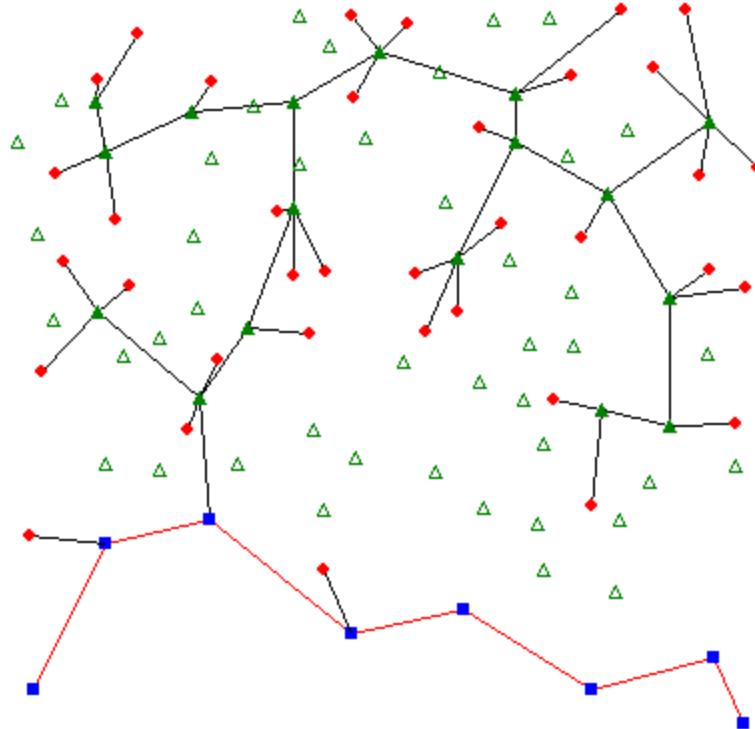
# Algoritmos genéticos



10 variáveis de decisão binárias (10 triângulos).

Pretende-se expandir a rede elétrica de modo a abastecer as casas (círculos vermelhos). As casas podem ser ligadas directamente a fontes de energia (quadrados azuis), ou podem ser ligadas primeiro a transformadores (triângulos). O objectivo é expandir a rede da maneira mais económica possível.

# Algoritmos genéticos



Algoritmo genético descobriu esta solução passado algumas gerações

Um exemplo com 60 variáveis de decisão binárias.

$2^{60} \approx 100000000000000000000000$  de hipóteses possíveis!

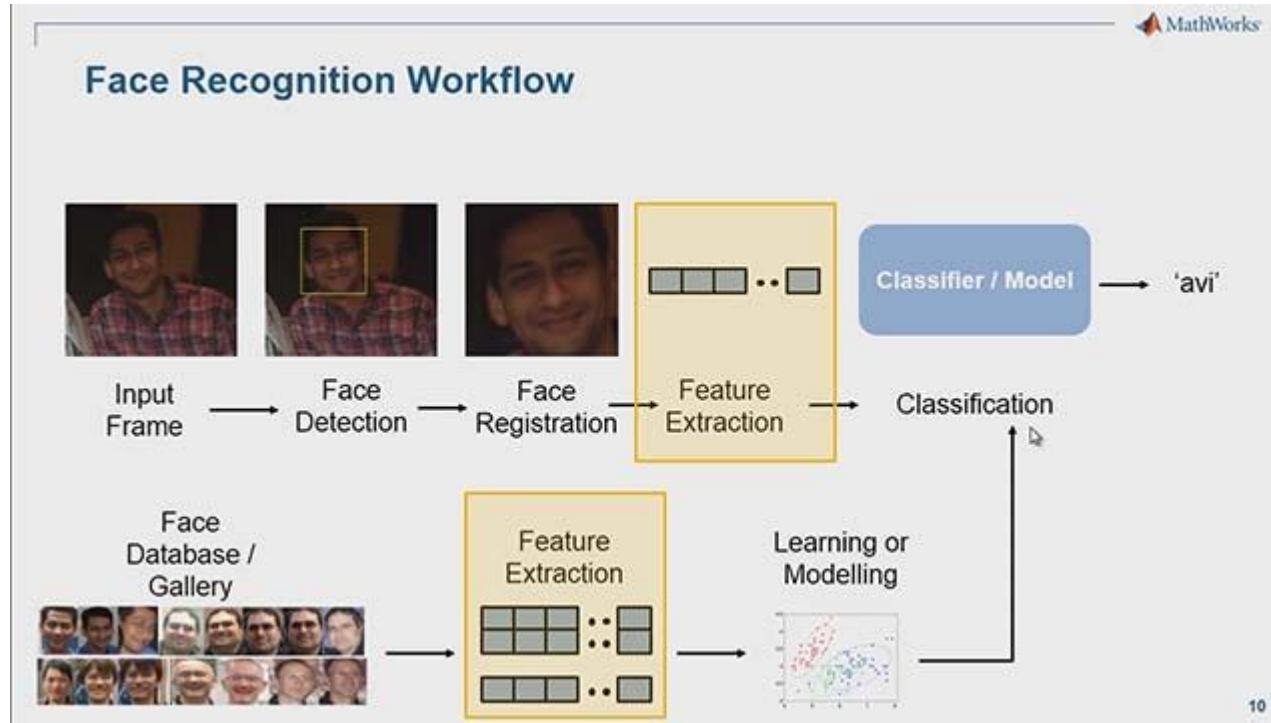
# Programação genética

Karl Sims



<https://www.youtube.com/watch?v=bBt0imn77Zg>

# Reconhecimento de padrões



Classificação de objectos em categorias ou classes  
Utilização em reconhecimento de imagens, escrita, voz

# Modelação baseada em agentes



<https://www.youtube.com/watch?v=UaC0UoakO7k>

# Inteligência artificial

Design

Busca

Planeamento

Segurança

Computação

“Human augmentation” (bots et al.)

# Inteligência artificial

bots ([www.conversable.com](http://www.conversable.com))

## MESSAGING IS THE NEW APP PLATFORM

Consumers and brands will now connect directly through one to one conversations in whichever channel the consumer prefers.



— 20 YEARS AGO —

websites & email



— 5 YEARS AGO —

mobile apps

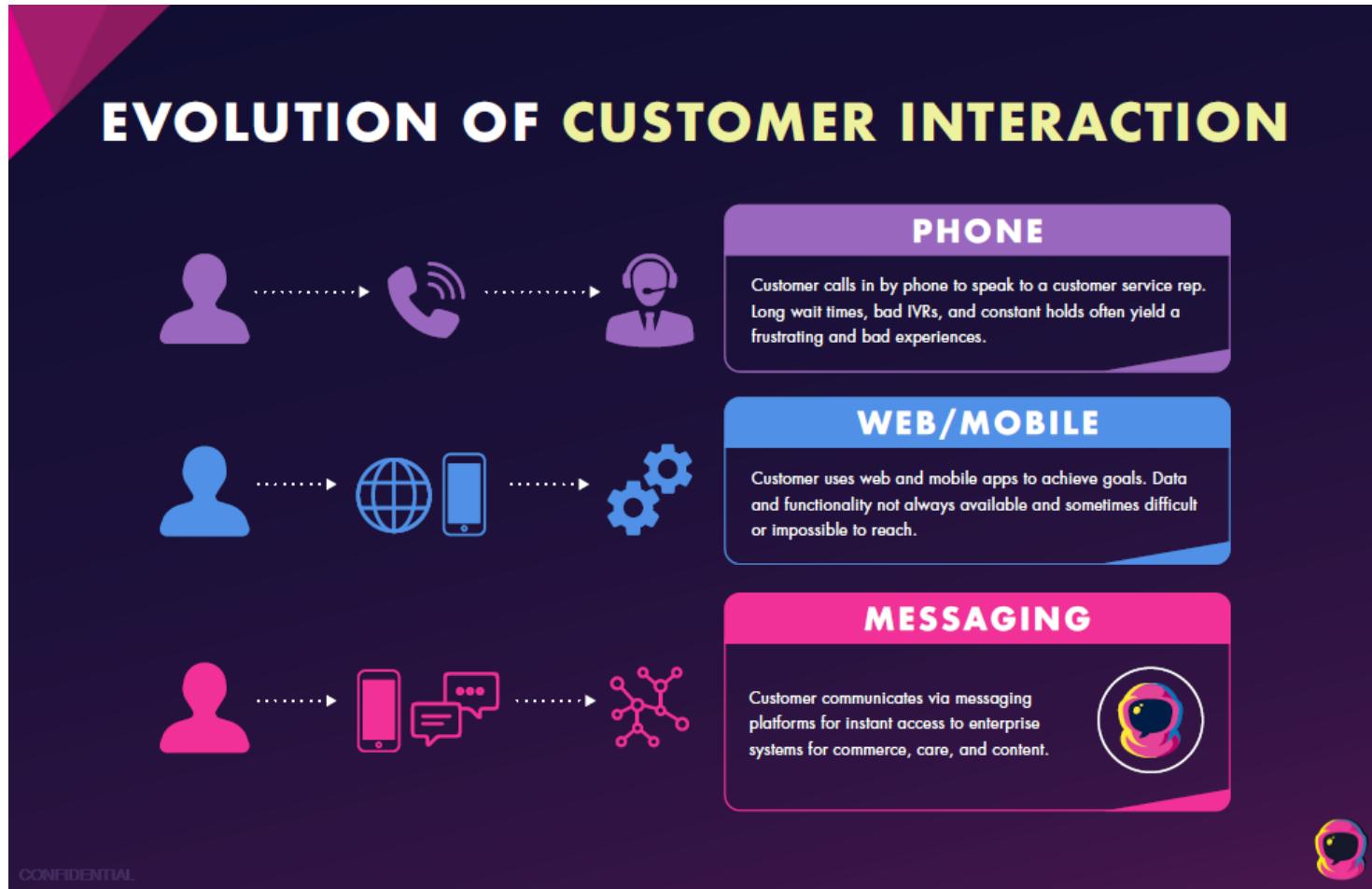


— PRESENT DAY —

interactive messaging



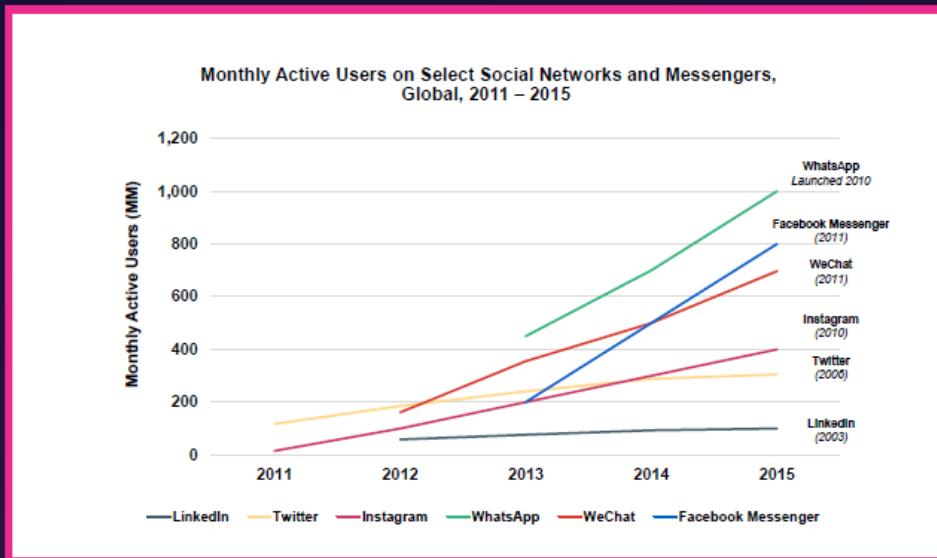
# Inteligência artificial bots



# Inteligência artificial bots

## AND MESSAGING USE IS EXPLODING

Mary Meeker's 2016 internet trends reports shows the continued rapid growth of messaging apps.



# Inteligência artificial bots

## WHILE APP FATIGUE CONTINUES

Day in Life of a Mobile User, 2016					
	Average # Apps Installed on Device*	Average Number of Apps Used Daily	Average Number of Apps Accounting for 80%+ of App Usage	Time Spent on Phone (per Day)	Most Commonly Used Apps
USA	37	12	3	5 Hours	Facebook Chrome YouTube
Worldwide	33	12	3	4 Hours	Facebook WhatsApp Chrome

Source: 2016 Internet Trends Report - KPCB Mary Meeker

Average Global Mobile User = ~33 Apps

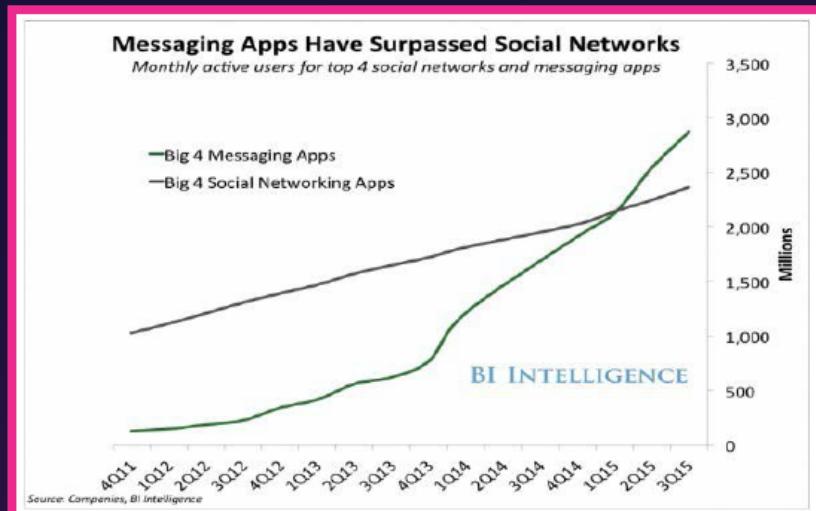
80% of Time Spent in 3 Apps  
12 Apps Used Daily



# Inteligência artificial bots

## MESSAGING IS ALREADY BIGGER THAN SOCIAL MEDIA

A 2015 study notes the combined user base of the top chat apps (including WhatsApp, WeChat, and Viber) and noted that these applications surpassed the user base of the top four social media platforms (Facebook, Twitter, LinkedIn, and Instagram) - at roughly 2.125 billion users.

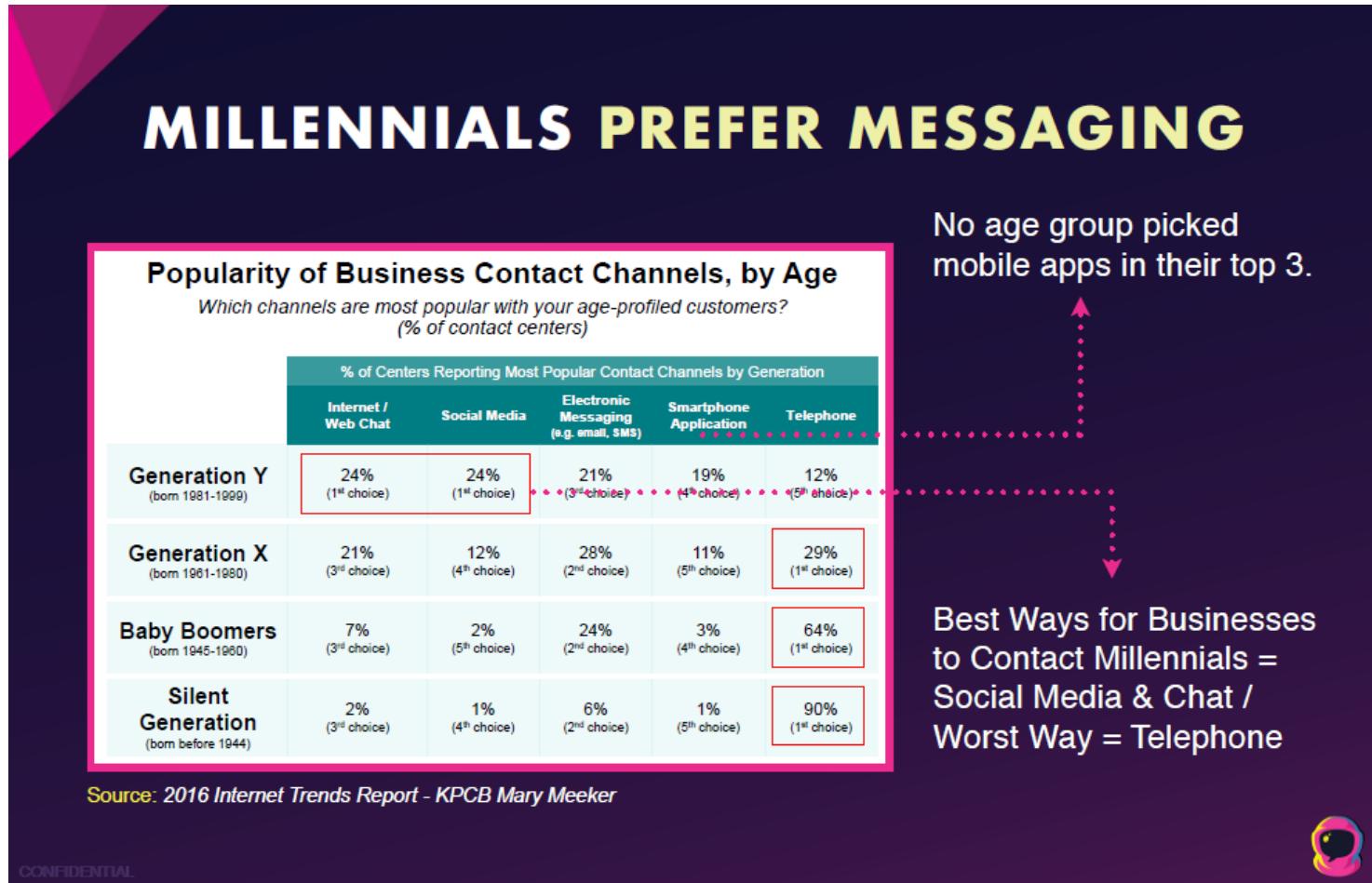


These discernible market trends point towards conversational commerce as a more seamless option for businesses to integrate and personalize the entire B2C user experience – from technology enhancements and tailored content to the commerce experience and overall customer service.

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# Inteligência artificial bots



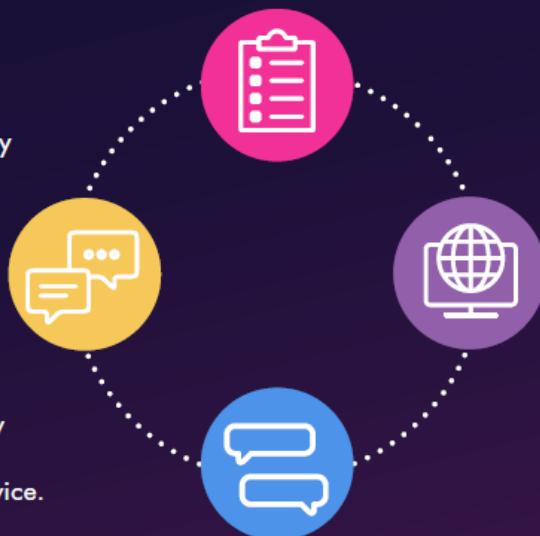
# Inteligência artificial bots

## HIGH LEVEL USE CASES

Consumers and brands can *connect directly* through *one-to-one conversations* in a variety of use cases including content, customer service, commerce, and internal.

### CONTENT

Deliver the right content to the end user when they ask for it.



### INTERNAL

Replace your outdated intranet portal with something that is modern, snappy and useful.

### CARE

Answer questions quickly to efficiently deliver next generation customer service.

### COMMERCE

Help your customer find what they are looking for and complete a purchase.

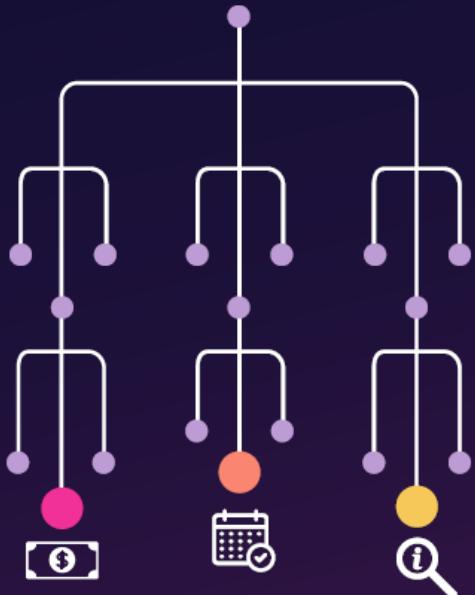


# Inteligência artificial

## bots

### USING CONVERSATIONAL FLOWS

The Conversable platform focuses on building *conversational flows*.



The purpose of a conversational flow is to  
*guide a user to a desired outcome*:



#### PLACE AN ORDER



#### FIX AN ISSUE

(reset route, schedule service call, etc.)



#### FIND INFORMATION

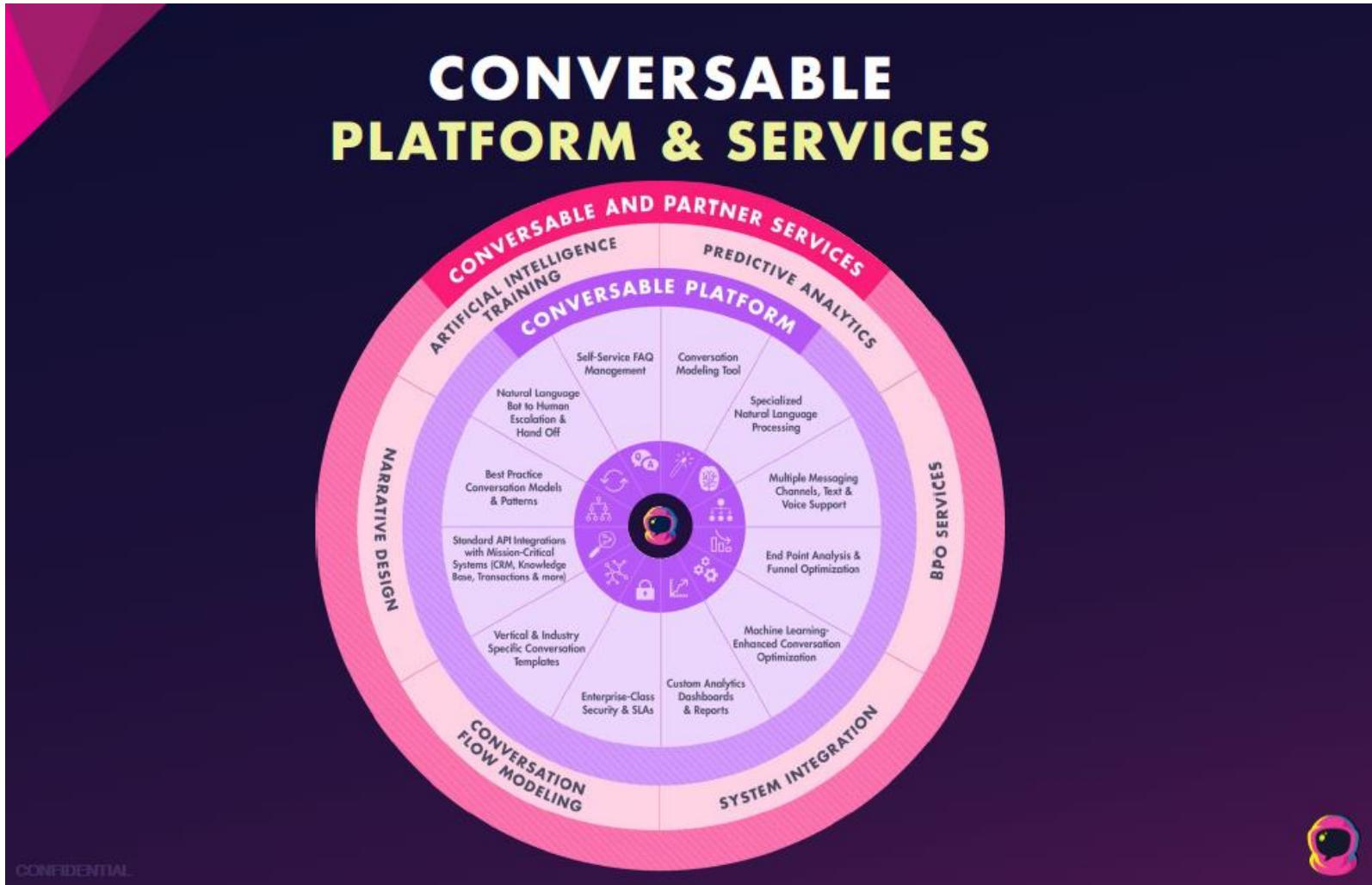
(which terminal, store location, etc.)

*Conversational flows can have many branches and outcomes.*

The conversation flow can be tuned over  
time by humans and/or machine learning.



# Inteligência artificial bots



# Inteligência artificial bots

**CONVERSABLE: SAME CONVERSATION  
ANY PLATFORM**

A large yellow circle contains a question and three options:

Would you like to add sauce?

- A ATOMIC
- B MANGO HABANERO
- C CAJUN

An arrow points from this circle to three mobile devices (two iPhones and one Amazon Echo). The devices show the same conversation interface, demonstrating cross-platform compatibility.

The devices display the following text:

Mango Habanero Pick Plate 1

Would you like to add sauce?

- (A) Atomic
- (B) Mango Habanero
- (C) Cajun

Atomic

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# Robótica

ver <https://www.slideshare.net/articacc/workshop-iniciacao-a-robotica-farrusco>

Autónomos ou controlados por seres humanos

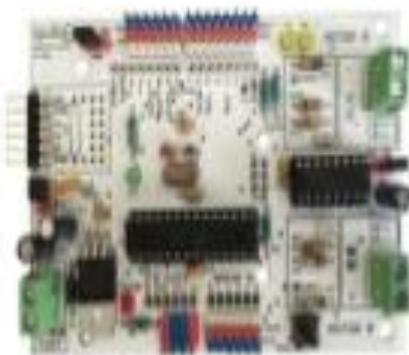
Generalistas ou para fins específicos

Sistema de controle

Sensores-actuadores

## Componentes do Farrusco

CPU Motoruino 1



Servo Motor



LED Multicolor



IR sensor



Roda Omnidirecional



Chassis



Motores DC



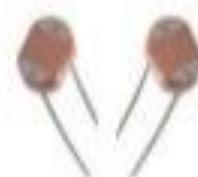
Rodas



Sensores de Colisão



Sensores de Luminosidade



## CPU



## Sensores



## Actuadores



# Robótica



<https://www.youtube.com/watch?v=bzDIJ6TTc6w>

# Robótica

Transporte

Cirurgia

Fabricação

Armazenamento

Limpeza

Manuseamento de objectos perigosos e bombas

Telepresença

# IA Generativa

[https://unchartedterritories.tomaspueyo.com/p/  
/generative-ai-everything-you-need](https://unchartedterritories.tomaspueyo.com/p/generative-ai-everything-you-need)