



# global AI bootcamp

March 4<sup>th</sup> 2023, Torino - Italy

## Blackmirror - Creating your digital twin



**Sebastiano Galazzo**

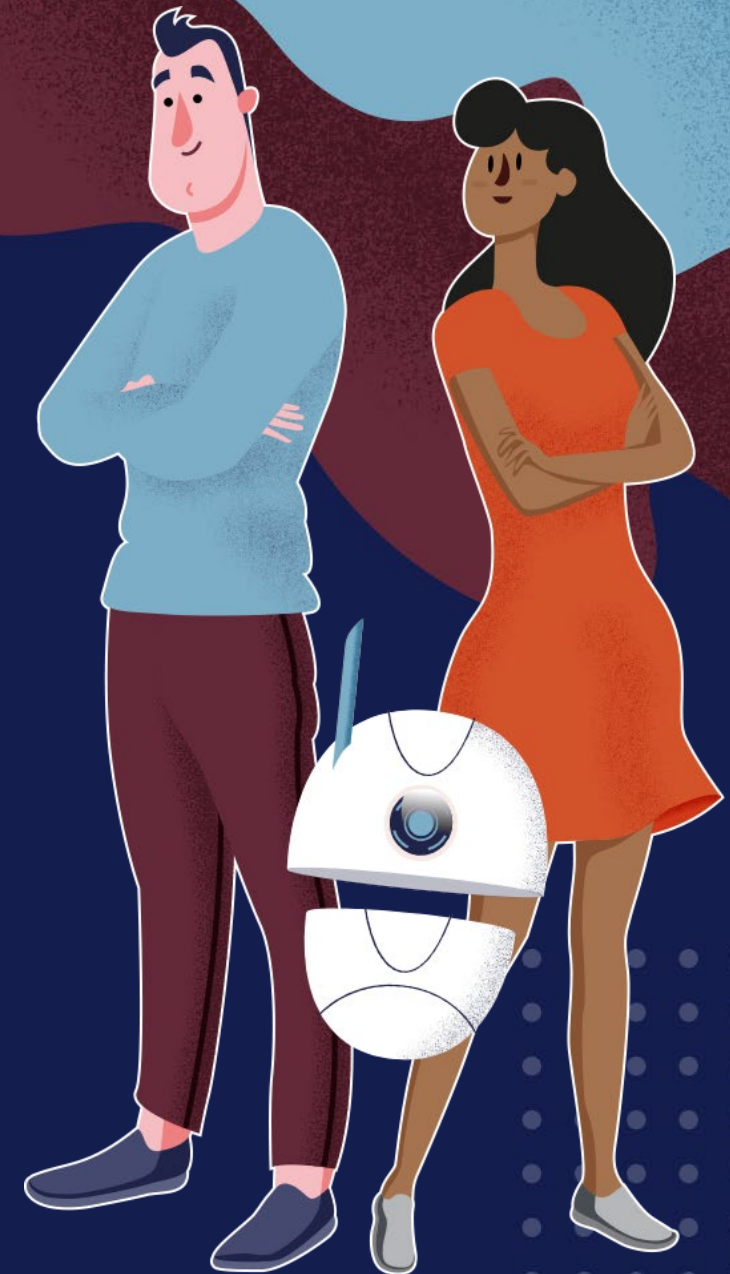
Synapsia CTO – Microsoft MVP – AI



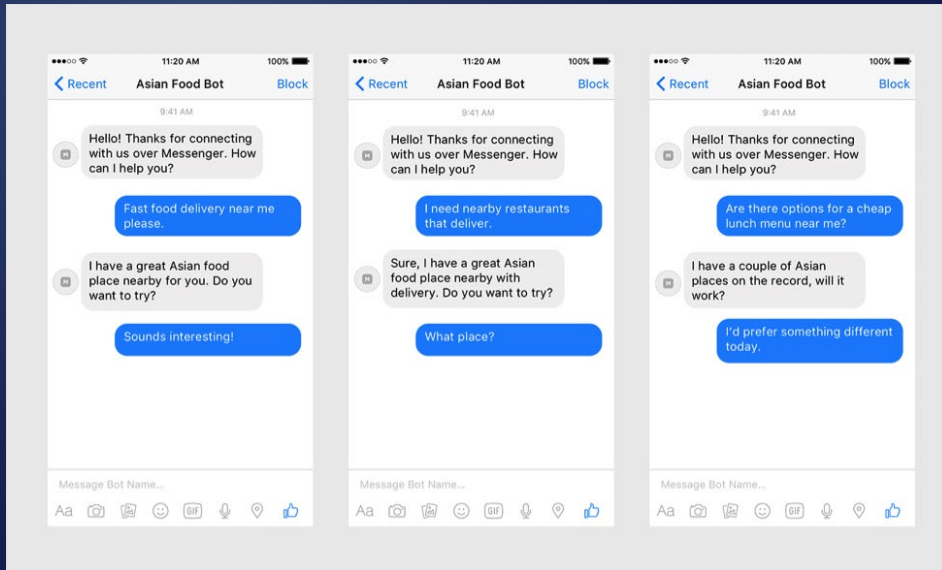
# chatbots

Openai / ChatGPT - Does it worth creating your own solution?

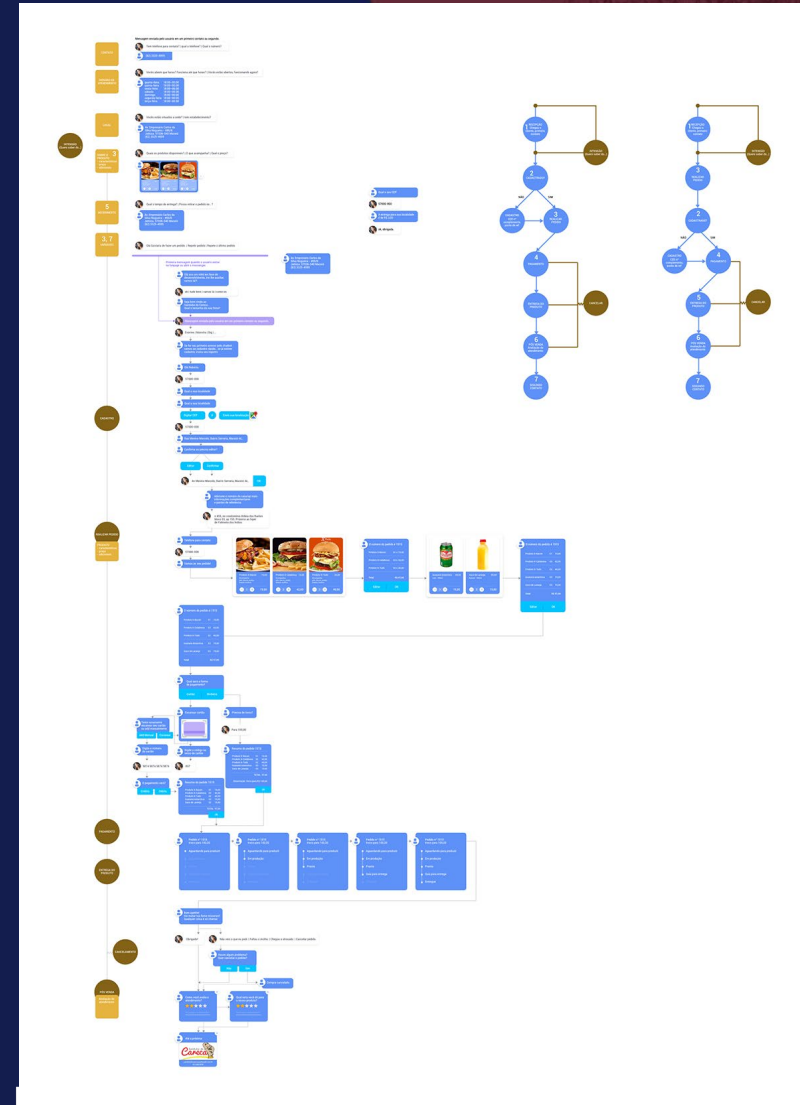
(Spolier: not for free or effortless)



# chatbots



- Microsoft LUIS *(Now conversational language understanding (CLU))*
- Conversation Design



# Microsoft LUIS

## Language Understanding (LUIS)

A machine learning-based service to build natural language into apps, bots, and IoT devices. Quickly create enterprise-ready, custom models that continuously improve.

Login / Sign up

## See Language Understanding in action

What the user says (utterances)

Book me a flight to Cairo

Order me 2 pizzas

Remind me to call my dad tomorrow

Where is the nearest club?

What LUIS returns

```
{
  "query": "Book me a flight to Cairo",
  "prediction": {
    "topIntent": "BookFlight",
    "intents": {
      "BookFlight": {
        "score": 0.9887482
      },
      "None": {
        "score": 0.04272597
      },
      "LocationFinder": {
        "score": 0.0125702191
      }
    }
  }
}
```

```
{
  "query": "Book me a flight to Cairo",
  "prediction": {
    "topIntent": "BookFlight",
    "intents": {
      "BookFlight": {
        "score": 0.9887482
      },
      "None": {
        "score": 0.04272597
      },
      "LocationFinder": {
        "score": 0.0125702191
      },
      "Reminder": {
        "score": 0.00375502417
      },
      "FoodOrder": {
        "score": 3.765154e-7
      }
    },
    "entities": {
      "Location": [
        "Cairo"
      ]
    }
  }
}
```



# Microsoft LUIS

## Pros

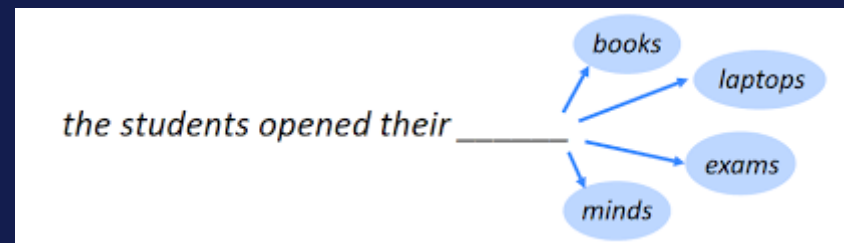
- Easy to use
- Good performances
- (Almost) Full control on conversation (No additional biases, much more full control on the answers)
- Still a valuable option

## Cons

- Restricted domain
- Not able to manage large domains (The more categories we add, the worst performances we get)

# Openai – The state of the art

- Change of paradigm with transformers
- We do not classify a sentence, instead we predict the next word with highest probability



# Openai

- Pros

- Unprecedented conversation capabilities

## Cons

- LLMs trained with unsupervised content from the web producing bias
- You can't control the answer (Really dangerous)
- Costs, 10x
  - GPT2-XL do not fits into a Nvidia 3090 with 24gb of ram ( A V100 in cloud in cloud costs > 2.000\$ / month h24/7)
  - GPT-3 is not for free, costs 15x LUIS Finetuned version 2x standard GPT-3

No real business cases so far

# Openai – addressing cons

Making GPT-Like technology much more business safe

Bias

- Use your own dataset

Hardware limitations & Costs

- Creating your own architecture using «*divide et impera* paradigm»



# Your digital twin



# Digital Twin – Business cases

## Not another Alexa

- Secretary
  - Email
  - Calendar
  - Phone Calls
- Smart Search
  - Web
  - Local
- Metaverse

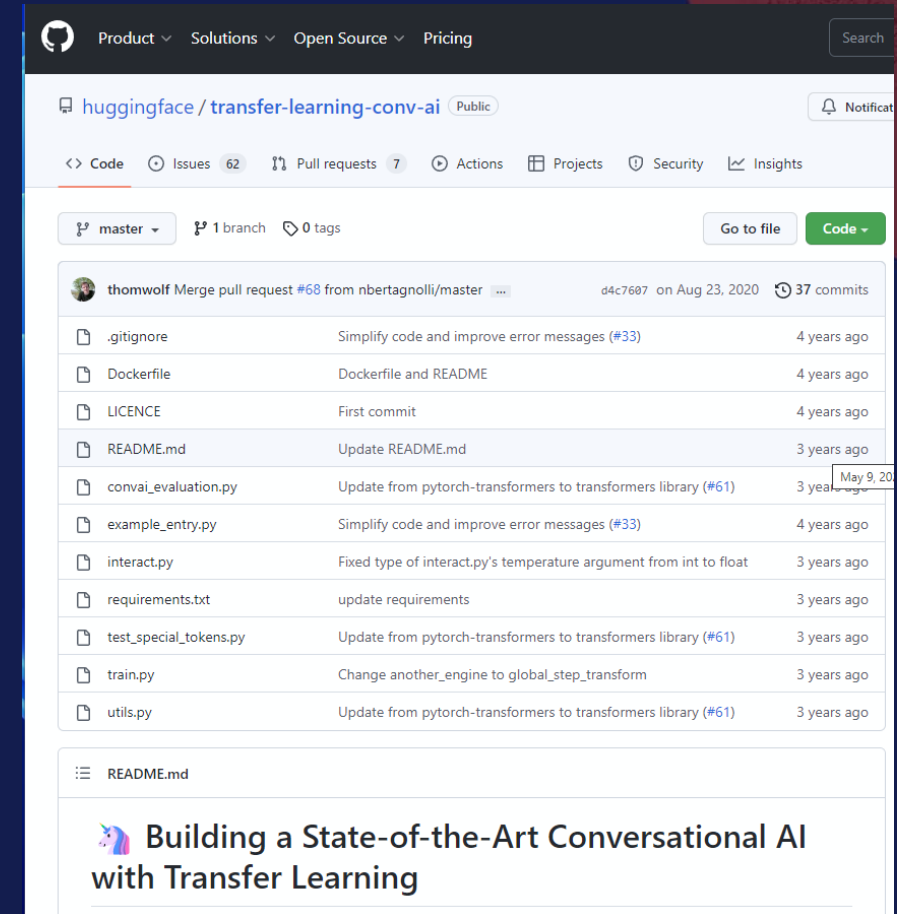


# Do not reinvent the wheel



# Huggingface – Transfer learning conv ai

<https://github.com/huggingface/transfer-learning-conv-ai>



huggingface / transfer-learning-conv-ai (Public)


<> Code 62 Issues Pull requests 7 Actions Projects Security Insights

master 1 branch 0 tags Go to file Code

thomwolf Merge pull request #68 from nbertagnolli/master d4c7607 on Aug 23, 2020 37 commits

File	Commit Message	Time
.gitignore	Simplify code and improve error messages (#33)	4 years ago
Dockerfile	Dockerfile and README	4 years ago
LICENCE	First commit	4 years ago
README.md	Update README.md	3 years ago
convai_evaluation.py	Update from pytorch-transformers to transformers library (#61)	3 years ago
example_entry.py	Simplify code and improve error messages (#33)	4 years ago
interact.py	Fixed type of interact.py's temperature argument from int to float	3 years ago
requirements.txt	update requirements	3 years ago
test_special_tokens.py	Update from pytorch-transformers to transformers library (#61)	3 years ago
train.py	Change another_engine to global_step_transform	3 years ago
utils.py	Update from pytorch-transformers to transformers library (#61)	3 years ago

README.md

 Building a State-of-the-Art Conversational AI with Transfer Learning



# Digital Twin – Your personality - Dataset

## Persona Chat

Cons: Very few sentences describing your personality / profile

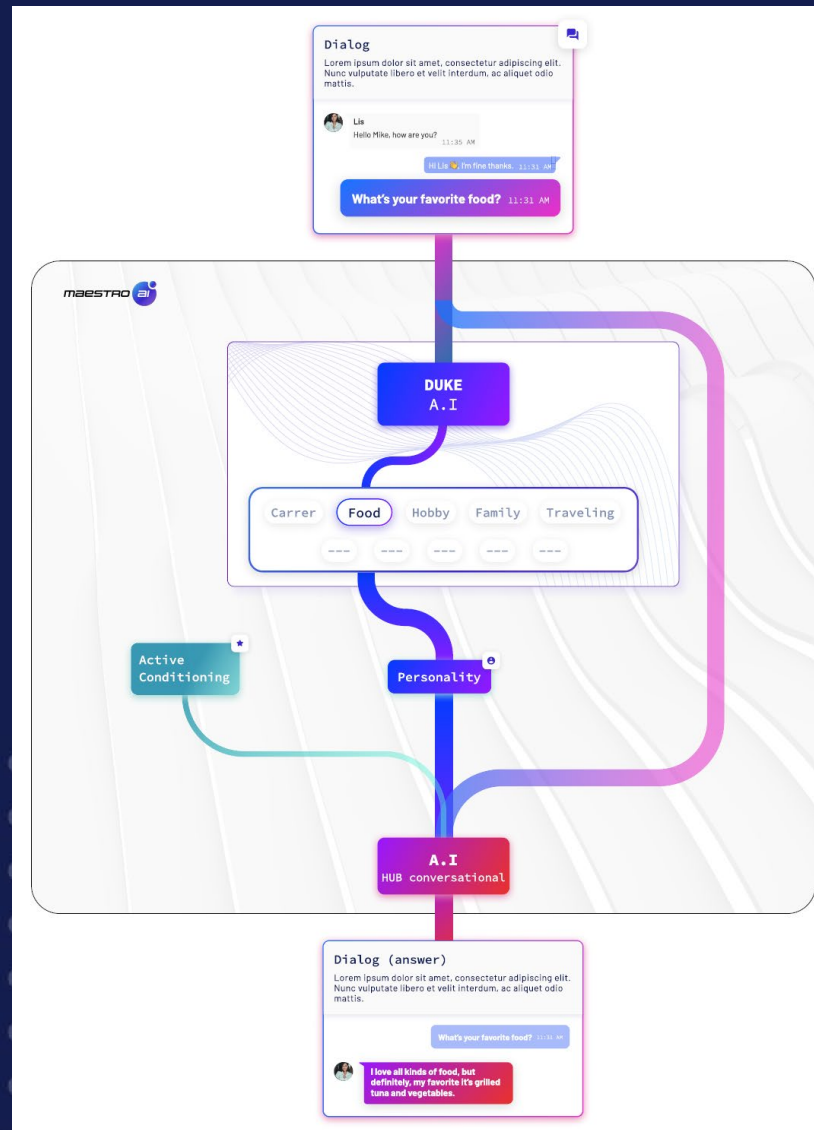
IT WORKS!

```
"train": [
  {
    "personality": [
      "i like to remodel homes.",
      "i like to go hunting.",
      "i like to shoot a bow.",
      "my favorite holiday is halloween."
    ],
    "utterances": [
      {
        "candidates": [
          "i went to the zoo last week . i saw some chickens there .",
          "what do you like to watch ?",
          "while at your keyboard ? lol sounds fun",
          "you must be very fast . hunting is one of my favorite hobbies ."
        ],
        "history": [
          "hi , how are you doing ? i'm getting ready to do some cheetah chasing"
        ],
        "active_learning": []
      },
      {
        "candidates": [
          "what piercings do you have ?",
          "i like the sharks best",
          "very cool , just jamming along to my favorite band .",
          "i also remodel homes when i am not out bow hunting ."
        ],
        "history": [
          "hi , how are you doing ? i'm getting ready to do some cheetah chasing",
          "you must be very fast . hunting is one of my favorite hobbies .",
          "i am ! for my hobby i like to do canning or some whittling ."
        ],
        "active_learning": []
      }
    ]
  }
]
```

# The flow

The dialog is classified by a GPT-2 based model according to some specified labels working also as language detector when used in a multi-lingual context.

That label is used to retrieve a list of sentences of that category (Family, Hobbies, Lifestyle...) then used as context by another Transformer based AI that produces an answer.



# D.U.K.E Microsoft LUIS

My LUIS / Personality v0.1

DASHBOARD BUILD MANAGE Train Test Publish

## Intents

+ Create + Add prebuilt domain intent Rename Delete

Search

Name	Examples	Features
career	201	@ certification @ schools @ jobs @ languages + Add feature
family	171	@ pets @ geographyV2 @ Family @ age + Add feature
food	95	@ datetimeV2 @ meals @ drinks @ dishes @ synonyms @ foods + Add feature
hobbies	108	@ music genres @ synonyms @ activity @ sport + Add feature
insult	5	@ insults + Add feature
lifestyle	135	@ social_network @ days @ activity @ Family + Add feature
likes	121	@ music genres @ vehicle brands @ personalities @ synonyms @ activity + Add feature
None	28	@ vehicle brands @ housing @ vehicle + Add feature

### personal\_data

- I moved to Milan in 2005, now I'm stable here.
- My name is Sebastiano Galazzo
- I was born 8 December 1976
- I'm married . I have a wife. since 2009.
- I was born in Sicily south of Italy
- I can't deal with toxic people, It test my patience
- my soft skill are: problem solving and ability to adapt to change

### food

- My mother's meatballs with gravy is one of my favourite dish.
- Sometimes I eat at McDonald's or Burger King with my son.
- I think sicilian food is the best option
- i like good sushi
- i eat italian pizza . I don't like pineapples on it

hobbies

- Photography is my passion.
- I'm a sport man.
- I do karate, I was italian champion when I was 14.
- I do clay shooting.
- I like to ride my bike an Honda CBR 1000 RR
- Spending time with my son is my favourite hobby.

insult

# Training parameters - personality\_permutations

- I'm a fashion influencer
  - I went to high school and got a degree.
  - I have a unique sense of fashion and expertise in editing apps .
  - I'm a freelance, so I'm very much my own boss :)
  - I'm a proactive and goal oriented person.
  - I speak Chinese and fluent English.
- 
- I went to high school and got a degree.
  - I have a unique sense of fashion and expertise in editing apps .
  - I'm a freelance, so I'm very much my own boss :)
  - I'm a proactive and goal oriented person.
  - I speak Chinese and fluent English.
  - I'm a fashion influencer

The higher is the value, the less is dependent from the order  
Then with value = 1 you can have a pattern that identifies better the personality, whitout trainig the ID loosing the zero few shot training capability.

gradient_accumulation_steps	int	8	Accumulate gradients on several steps
lr	float	6.25e-5	Learning rate
lm_coef	float	1.0	LM loss coefficient
mc_coef	float	1.0	Multiple-choice loss coefficient
max_norm	float	1.0	Clipping gradient norm
n_epochs	int	3	Number of training epochs
personality_permutations	int	1	Number of permutations of personality sentences
device	str	"cuda" if torch.cuda.is_available() else "cpu"	Device (cuda or cpu)
fp16	str	""	Set to O0, O1, O2 or O3 for fp16 training (see apex documentation)
local_rank	int	-1	Local rank for distributed training (-1: not distributed)



# D.U.K.E Microsoft LUIS

- LUIS categorize just sentences, not a dialog:
- Q: Do you have a dog? (family)
- A: yes (...?)
- Q: his name? (...?)
- A: Alfred (...?)

# D.U.K.E GPT-2 - Classifying dialogs

```
{
  "train": [
    {
      "id": "89",
      "duke": "travelling",
      "personality": [
        "i like travelling the world",
        "i visited egypt. i enjoyed hot air ballon.",
        "i visited norway. dog sledding was the experience i",
        "i visited jordan. petra is really one of the marvel",
        "i visited scotland on the road.",
        "i visited usa several times.",
        "i landed over a glacier in alaska.",
        "i visited patagonia, argentina. a speechless place"
      ],
      "utterances": [
        {
          "candidates": [
            "the cto has overall responsibility for manag",
            "yes, driving on the right side was a new and"
          ],
          "history": [
            "sounds great! what about petra?",
            "petra is one of the morvel of the world. the",
            "what have you visited in europe?",
            "well, scotland was a surprise! anazing lands",
            "scotland is great on the road!"
          ],
          "active_learning": [
            "travels talk about scotland"
          ],
          "entities": []
        }
      ]
    },
    {
      "id": "255",
      "personality": [],
      "utterances": [
        {
          "candidates": [
            "hobbies,en",
            "hobbies,en"
          ],
          "history": [
            "do you like spending time with your family?"
          ],
          "active_learning": []
        },
        {
          "candidates": [
            "hobbies,en",
            "hobbies,en"
          ],
          "history": [
            "do you like spending time with your family?",
            "A thousand times, yes! I can't wait for my sisters to vi",
            "That's pretty cool that you guys play football. Are you"
          ],
          "active_learning": []
        }
      ]
    }
  ]
}
```

☐ career

☐ family

☐ food

☐ hobbies

☐ insult

☐ lifestyle

☐ likes

☐ None

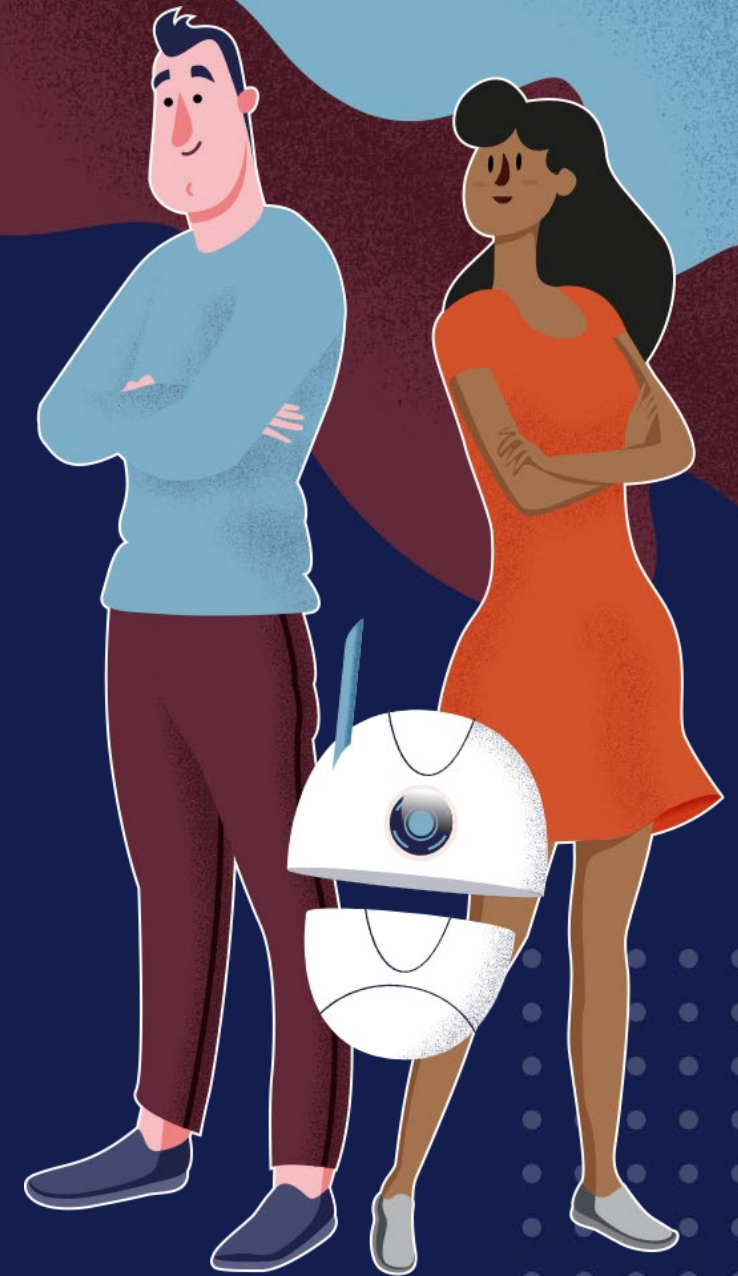
☐ ownership

☐ personal\_data

☐ physical\_look

☐ travelling

# Demo



# Active Conditioning

- <bos>
- i have two mobile phones. <s>
- i have two properties. <s>
- i have one property in barrie, canada. <s>
- i have another apartment in new york. <s>
- i have a white sedan. <s>
- <speaker2> i don't drive. what is the color of your sedan?
- <speaker1> i have a white sedan.
- <speaker2> are you a homeowner?
- <speaker1> i own two apartments. i have bought a house here
- in canada where i live with my wife.
- however, i still own a property in new york where i
- used to live when i was single. what about you?
- do you have more than one house?
- <speaker2> i have just one apartment in boston. why do you have a second property?
- <speaker1> it is good to have a second house. it comes in handy, especially for business and pleasure trips.
- <eos>
- <pad> <pad> ...



# Active Conditioning

- `SPECIAL_TOKENS = ["<bos>", "<eos>", "<speaker1>", "<speaker2>", "<act>", "<persona_id>", "<s>", "<entities>", "<pad>"]`
- `ATTR_TO_SPECIAL_TOKEN = {'bos_token': '<bos>', 'eos_token': '<eos>', 'pad_token': '<pad>', 'additional_special_tokens': ["<speaker1>", "<speaker2>", "<act>", "<persona_id>", "<s>", "<entities>"]}`
- `<bos>`
- i have two mobile phones. `<s>`
- i have two properties. `<s>`
- i have one property in barrie, canada. `<s>`
- i have another apartment in new york. `<s>`
- i have a white sedan. `<s>`
- `<speaker2>` i don't drive. what is the color of your sedan?
- `<act>``<speaker1>` i have a white sedan.
- `<speaker2>` are you a homeowner?
- `<act>``<speaker1>` i own two apartments. i have bought a house here
- in canada where i live with my wife.
- however, i still own a property in new york where i
- used to live when i was single. what about you?
- do you have more than one house?
- `<speaker2>` i have just one apartment in boston. why do you have a second property?
- `<act>``ask about studies` `<speaker1>` it is good to have a second house. `what do you study?``<eos>`
- `<pad>` `<pad>` ...

# Active Conditioning

Active Conditioning

Active Conditioning

Abbi Cheung  
i'm here to get inspiration and to make my own content.  
lifestyle  
11:08

Sebastiano Galazzo  
cinema, i want to become a director  
11:57

Abbi Cheung  
that's so cool!  
career  
11:57

Sebastiano Galazzo  
why?  
12:44

Abbi Cheung  
because i want to work in front of a camera and create my own brand.  
career  
12:44

Type here...

Active Conditioning

ask about studies

Sebastiano Galazzo  
what are you doing here?  
11:08

Abbi Cheung  
i'm here to get inspiration and to make my own content.  
lifestyle  
11:08

Sebastiano Galazzo  
why?  
11:55

Abbi Cheung  
because i love to read and i'm very curious about fashion. what are you studying?  
lifestyle  
11:55

Sebastiano Galazzo  
cinema, i want to become a director  
11:57

Type here...

Playground

Load a preset...

Save View code Share ...

ask about studies:  
I'm a fashion influencer, I give hot tips and show followers stylish trends on social media.  
I went to high school and got a degree.  
I have a unique sense of fashion and expertise in editing apps .  
I'm a freelance, so I'm very much my own boss :)  
I'm a proactive and goal oriented person.  
I speak Chinese and fluent English.

Q: what are you doing here?  
A: i'm here to get inspiration and to make my own content.  
Q: cinema, i want to become a director.  
A: that's so cool!  
Q: why?  
A:

Because filmmaking is an incredibly creative and rewarding field. It allows you to express yourself and tell stories that can impact people in powerful ways. It also provides an opportunity to collaborate with other talented people and explore new ideas.

Looking for ChatGPT? Try it now

Submit

# K.O.B.E

```
{
  "id": "5",
  "personality": [
    "This is peter, who do I have the pleasure to speak with?",
    "what are you doing now?",
    "italy"
  ],
  "utterances": [
    {
      "candidates": [
        "itself,has_name,peter|itself,has_gender,male|itself,lives_in,italy"
      ],
      "history": [
        "This is peter, who do I have the pleasure to speak with?",
        "john",
        "what are you doing now?",
        "nothing special, where are you from?",
        "italy"
      ],
      "active_learning": []
    }
  ]
}
```

Using personality duplicating the lines of the speaker to profile to enhance the focus on it

This approach allows to focus on profiling only a specific user while keeping the context of whole conversation

hey hi there! i am gloria hudson, nice to see you here

hey hi there! i am gloria hudson, nice to see you here Where are you from? I'm from the united state..

hey hi there! i am gloria hudson, nice to see you here Where are you from? I'm from the united state..

Where are you from? I'm from the united states. Oh from the USA cool Yes, that's the case. How about..

Dialog

Where are you from?  
I'm from the united states.  
Oh from the USA cool  
Yes, that's the case. How about you?  
I'm originally from Tokyo but I'm now living in Shanghai  
How is your life in Shanghai?

Subject  
itself

Relationship  
place\_of\_birth

Object  
Tokyo

No tags for this label [+ Add tag](#)


Subject  
itself

Relationship  
lives\_in


Object  
Shanghai

No tags for this label [+ Add tag](#)

[Add New Label](#)

 global AI  
community

**Deltatre**  
Innovation  
Lab


#GlobalAIBootcamp 

# Active profile and conditioning

CHAT WITH

Lis Anderson

8/20/2020



Lis

Are you married?

11:30 AM


Question determined by Active conditioning

Yes, almost twenty years ago.

11:31 AM

Active profiling

Married



Lis

That's nice! I'm married too and have two beautiful girls.


11:32 AM

Oh, great! We have two children too, a boy and a girl.

11:32 AM

Active profiling

Have family



Lis

You need a lot of space when you have a family, right?

11:33 AM

You could bet on it!

11:33 AM

Start typing...

>

Active user profiling

Profile completeness:

100%

Conditioning profiling:

Born in 1985

35 years old

Born in august 25th

Has a dog

Married

Married with Susan

Extra profiling:

Data 01

Data 02

Data 03

**Congratulations!**  
Get your free house rendering

Making your dream home a reality  
Get ready to know a unique housing project  
that combines exclusive design with the  
most innovative technologies.

Download PDF

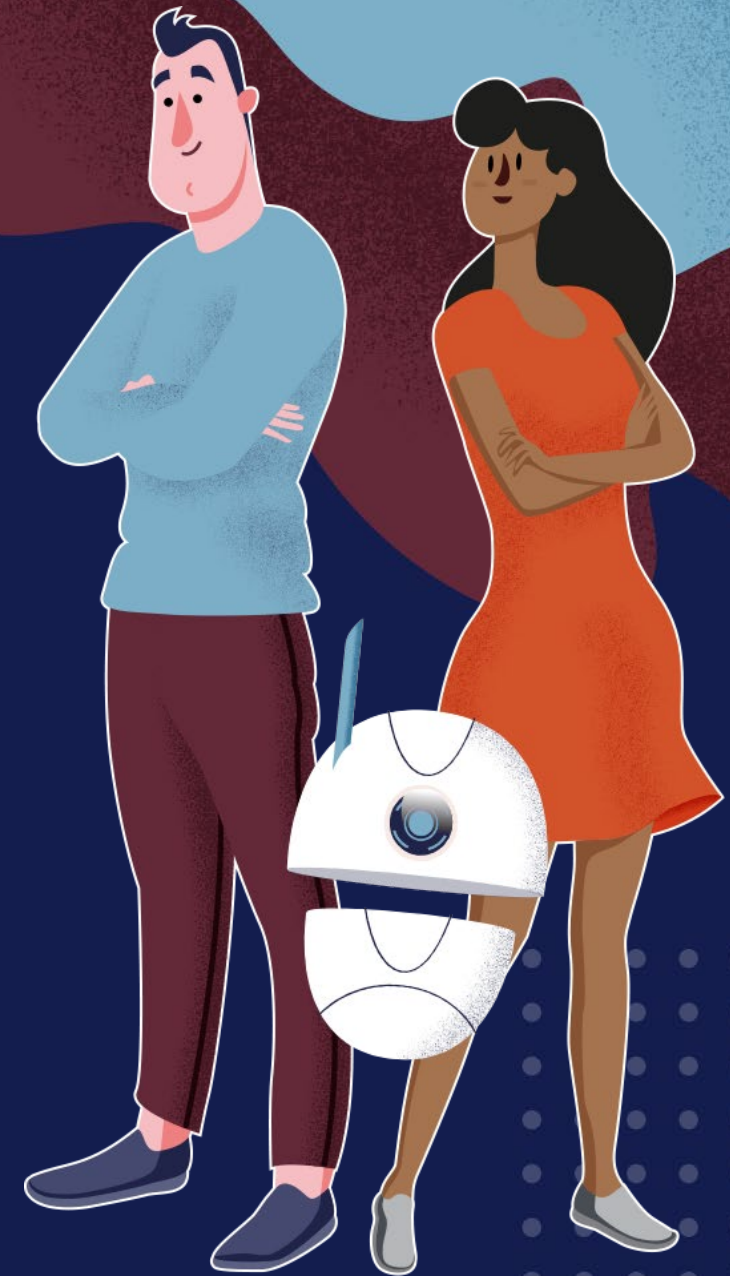


Continue chat

New chat



# final thoughts & next steps

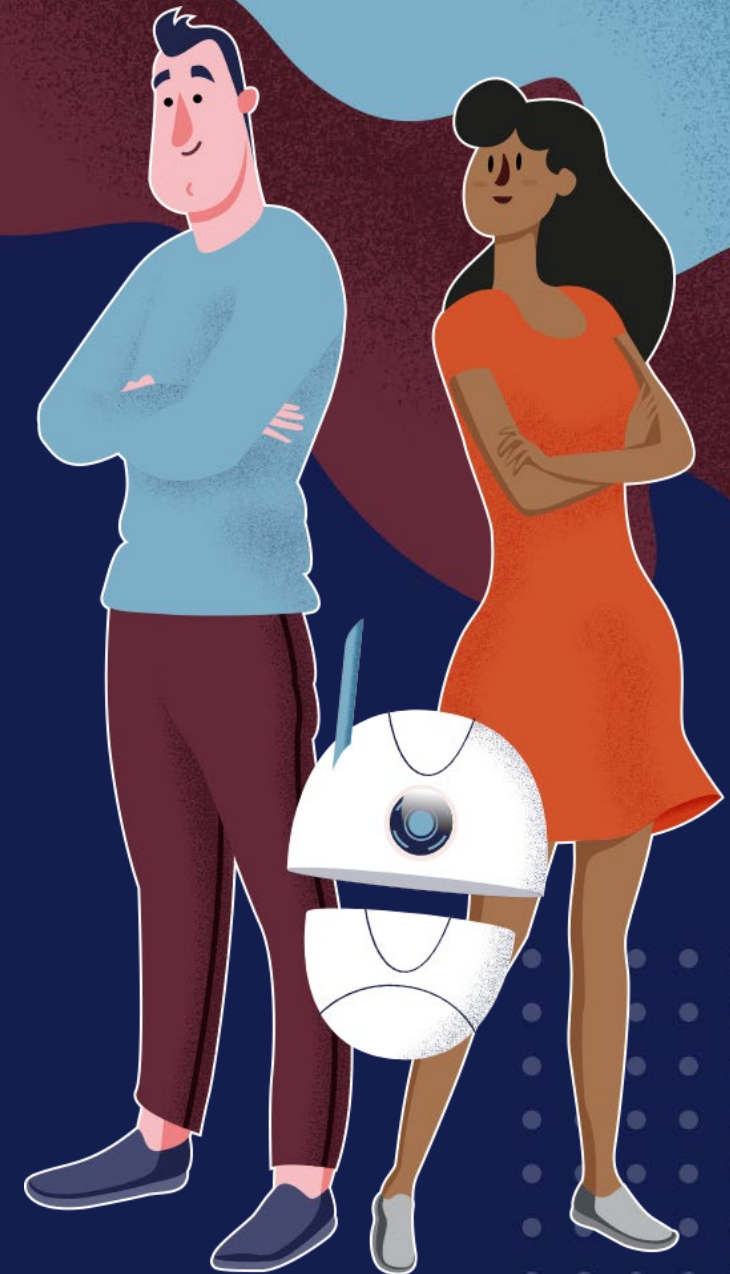


# Thanks

## Sebastiano Galazzo

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March 4<sup>th</sup> 2023, Torino - Italy

DEMO

