

system of word generation

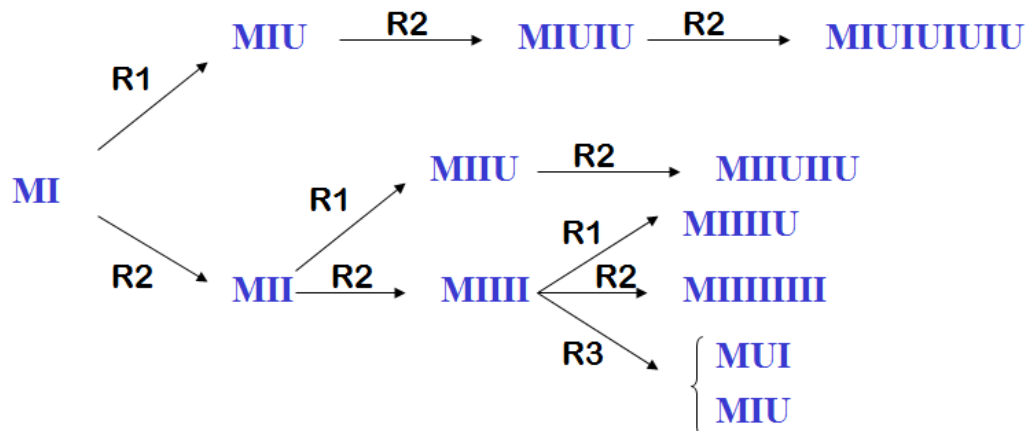
– **Axiome MI**

– **Règles: pour tout $\alpha, \beta \in V^*$**

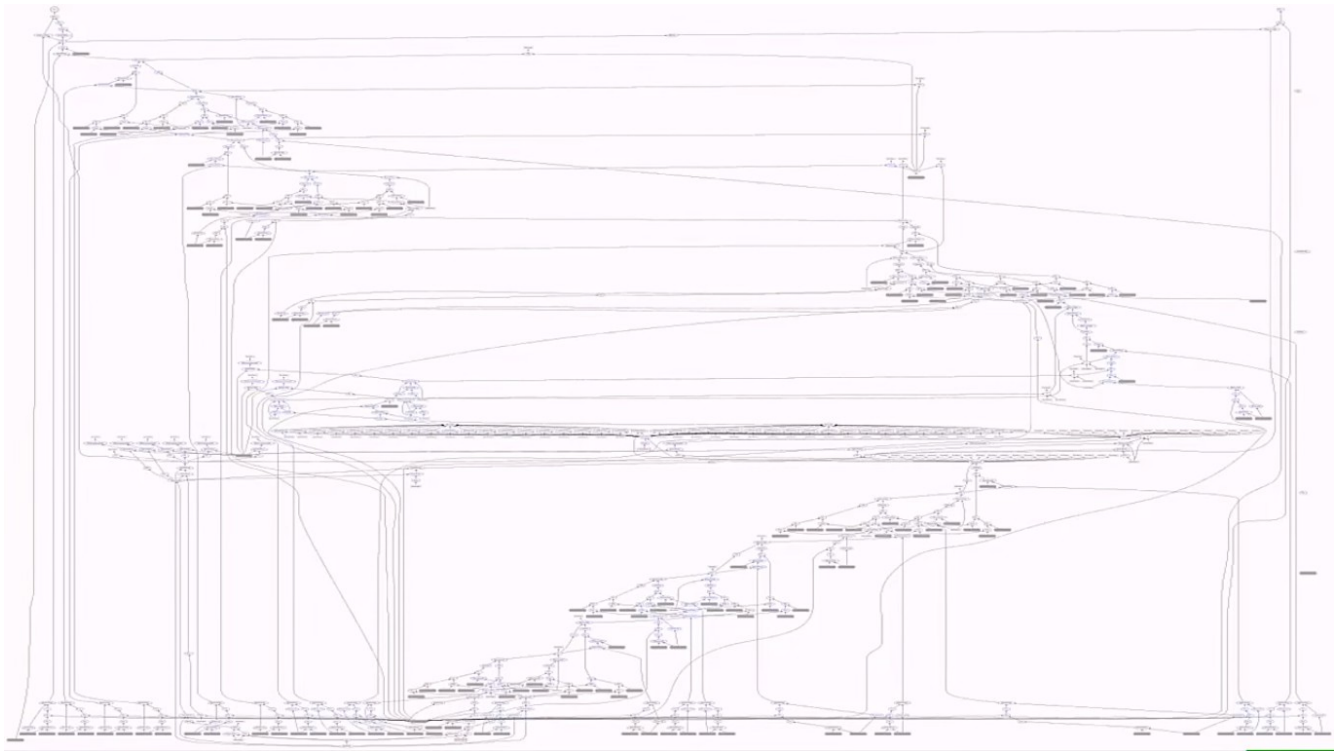
- [R1] $\alpha I \rightarrow \alpha IU$
- [R2] $M\alpha \rightarrow M\alpha\alpha$
- [R3] $\alpha III\beta \rightarrow \alpha U\beta$
- [R4] $\alpha UU\beta \rightarrow \alpha\beta$

Système de production

- **Peut on obtenir le mot MU ?**



And here we see that not all problems have solutions with calculations and mathematical models so our main goal is to create some system that answers simple queries and problems but then using deep neural learning techniques to generate some swarm intelligence using the power of the collective system that we will implement using one of different deep learning frameworks and toolkits and even libraries like caffe , torch , tensorflow or even microsoft CNTK like this example below



So to start understanding our system and use cases we need to classify our data like for example in watson NLC service here

```

1 I'd like to send an email,action-email-create
2 Draft new email,action-email-create
3 Compose new email,action-email-create
4 Send email,action-email-create
5 Draft email,action-email-create
6 Compose email,action-email-create
7 Send e-mail,action-email-create
8 Draft e-mail,action-email-create
9 Compose e-mail,action-email-create
10 New email,action-email-create
11 New e-mail,action-email-create
12 Email,action-email-create
13 Email *,action-email-create
14 Email compose,action-email-create
15 Email new,action-email-create
16 Compose letter,action-email-create
17 Take a memo to recipient *,action-email-create
18 Email draft,action-email-create
19 Draft email to *,action-email-create
20 Compose email to *,action-email-create
21 New email message,action-email-create
22 New email message to *,action-email-create
23 New message for *,action-email-create
24 Schedule a meeting,action-meeting-create
25 Arrange a meeting at *,action-meeting-create
26 Make a meeting with *,action-meeting-create
27 I want to meet at * with *,action-meeting-create
28 I need to meet with * at *,action-meeting-create
29 New meeting now,action-meeting-create
30 Make a meeting,action-meeting-create
31 Add meeting to schedule,action-meeting-create
32 Add meeting to calendar,action-meeting-create
33 Help me add a meeting to calendar,action-meeting-create
34 Help me add meeting to schedule,action-meeting-create
35 Schedule meeting for next *,action-meeting-create
36 Schedule call for next *,action-meeting-create
  
```

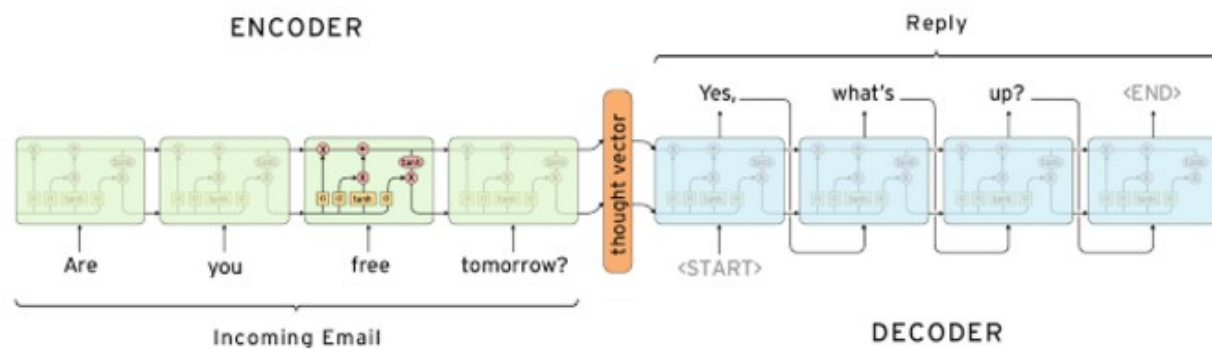
but then with big data the problem comes with which approuche we zill use for defining our models because they can be from retrieval or even generated in complex systems

A TAXONOMY OF MODELS

RETRIEVAL-BASED VS. GENERATIVE MODELS

Retrieval-based models (easier) use a repository of predefined responses and some kind of heuristic to pick an appropriate response based on the input and context. The heuristic could be as simple as a rule-based expression match, or as complex as an ensemble of Machine Learning classifiers. These systems don't generate any new text, they just pick a response from a fixed set.

Generative models (harder) don't rely on pre-defined responses. They generate new responses from scratch. Generative models are typically based on Machine Translation techniques, but instead of translating from one language to another, we "translate" from an input to an output (response).



but then to try to encode queries and then decode a response will be using a third party system so we will perform data cleaning, pre-processing, classification. While doing this one requires some NLP system to do grammatical and syntactical classifications

- Data tokenization
- Stop word removal
- Part of speech tagging
- Noun entity extraction
- Sentence parsing etc

NLP will help you here. When you do numeric classification, text classification or perform some recommendation; NLP helps to do it better

stanfordnlp.github.io/CoreNLP/

Stanford CoreNLP

Named Entity Recognition:

1. President Xi Jinping of China, on his first state visit to the United States, showed off his familiarity with American history and pop culture on Tuesday night.

Coreference:

1. President Xi Jinping of China, on his first state visit to the United States, showed off his familiarity with American history and pop culture on Tuesday night.

Basic Dependencies:

stanford-classifier-20...zip

stanford-corenlp-full...zip

Rechercher sur le web et dans Windows

21:20 10/08/2016

but then the need of deep learning methods and techniques is very important so that we can create our

models that can one of 2

OPEN DOMAIN VS. CLOSED DOMAIN

In an **open domain (harder)** setting the user can take the conversation anywhere. There isn't necessarily have a well-defined goal or intention. Conversations on social media sites like Twitter and Reddit are typically open domain – they can go into all kinds of directions. The infinite number of topics and the fact that a certain amount of world knowledge is required to create reasonable responses makes this a hard problem.

In a **closed domain (easier)** setting the space of possible inputs and outputs is somewhat limited because the system is trying to achieve a very specific goal. Technical Customer Support or Shopping Assistants are examples of closed domain problems. These systems don't need to be able to talk about politics, they just need to fulfill their specific task as efficiently as possible. Sure, users can still take the conversation anywhere they want, but the system isn't required to handle all these cases – and the users don't expect it to.

and then when we have different models for different classes we can coordinate between them using a dialog system like for this entity and intent used by api.ai services

information.json

```
1 ▼ {
2   "id": "18cb5238-833d-4f18-81f6-5f4bbde3866b",
3   "name": "Information",
4   "isOverridable": true,
5   "entries": [
6     {
7       "value": "Information",
8       "synonyms": [
9         "Information",
10        "info",
11        "news",
12        "bin",
13        "recycling"
14      ]
15    },
16    {
17      "value": "detail",
18      "synonyms": [
19        "detail",
20        "detailed",
21        "precise",
22        "advance"
23      ]
24    }
25  ],
26  "isEnum": false,
27  "automatedExpansion": true
28 }
```

```

1  ▾ {
2    "id": "85c4d5b5-0828-4aea-a73b-82238524f75b",
3    "name": "tell me about @Information:Information",
4    "auto": true,
5    ▾ "contexts": [
6      "tell_me_about_recycling"
7    ],
8    ▾ "userSays": [
9      {
10       "id": "ece54b8b-0959-45ae-b7b2-b24cce24f8d4",
11       ▾ "data": [
12         {
13           "text": "give me "
14         },
15         {
16           "text": "infos",
17           "alias": "Information",
18           "meta": "@Information",
19           "userDefined": true
20         },
21         {
22           "text": " about "
23         },
24         {
25           "text": "recycling",
26           "alias": "Recycle",
27           "meta": "@Recycle",
28           "userDefined": true
29         }
30       ],
31       "isTemplate": false,
32       "count": 0
33     },
253 ▶ { ... }
269 ],
270 ▾ "responses": [
271   {
272     "resetContexts": false,
273     "action": "informaton_action",
274     ▾ "affectedContexts": [
275       {
276         "name": "tell_me_about_information",
277         "lifespan": 5
278       },
279 ▶ { ... }
283     ],
284     ▾ "parameters": [
285       {
286         "required": true,
287         "dataType": "@Information",
288         "name": "Information",
289         "value": "$Information"
290       },
291 ▶ { ... },
298 ▶ { ... },
303 ▶ { ... }
308     ],
309     ▾ "speech": [
310       "Recycling is something that we can all do.
311       Children that are school age and older can help out
312       too.",
313       "The goal is to stop tossing out items that
314       we can use again and again."
315     ]
316   },
317   {
318     "resetContexts": false,
319     "action": "recycling_action",
320     ▾ "affectedContexts": [
321       {
322         "name": "recycling_information",
323         "lifespan": 5
324       },
325       {
326         "name": "recycling_recycle",
327         "lifespan": 5
328       },
329       {
330         "name": "recycling_recycling",
331         "lifespan": 5
332       }
333     ],
334     ▾ "parameters": [
335       {
336         "required": true,
337         "dataType": "@Recycling",
338         "name": "Recycling",
339         "value": "$Recycling"
340       },
341       {
342         "required": true,
343         "dataType": "@Recycle",
344         "name": "Recycle",
345         "value": "$Recycle"
346       },
347       {
348         "required": true,
349         "dataType": "@Information",
350         "name": "Information",
351         "value": "$Information"
352       }
353     ],
354     "speech": "Recycling is something that we can all do.
355     Children that are school age and older can help out
356     too."
357   }
358 ],
359 "state": "LEARNED",
360 "priority": 500000,
361 "webhookUsed": true,
362 "fallbackIntent": false
363 }

```

but then

INTENTION AND DIVERSITY

A common problem with generative systems is that they tend to produce generic responses like “That’s great!” or “I don’t know” that work for a lot of input cases. Early versions of Google’s Smart Reply **tended to respond with “I love you”** to almost anything. That’s partly a result of how these systems are trained, both in terms of data and in terms of actual training objective/algorithm. **Some researchers have tried to artificially promote diversity through various objective functions.** However, humans typically produce responses that are specific to the input and carry an intention. Because generative systems (and particularly open-domain systems) aren’t trained to have specific intentions they lack this kind of diversity.

and then different studies were made for personality insights so that the AI system will formulate proper responses to all customer queries

COHERENT PERSONALITY

When generating responses the agent should ideally produce consistent answers to semantically identical inputs. For example, you want to get the same reply to “How old are you?” and “What is your age?”. This may sound simple, but incorporating such fixed knowledge or “personality” into models is very much a research problem. Many systems learn to generate linguistic plausible responses, but they are not trained to generate semantically consistent ones. Usually that’s because they are trained on a lot of data from multiple different users. Models like that in [A Persona-Based Neural Conversation Model](#) are making first steps into the direction of explicitly modeling a personality.

```
message Where do you live now?
response I live in Los Angeles.
message In which city do you live now?
response I live in Madrid.
message In which country do you live now?
response England, you?
```

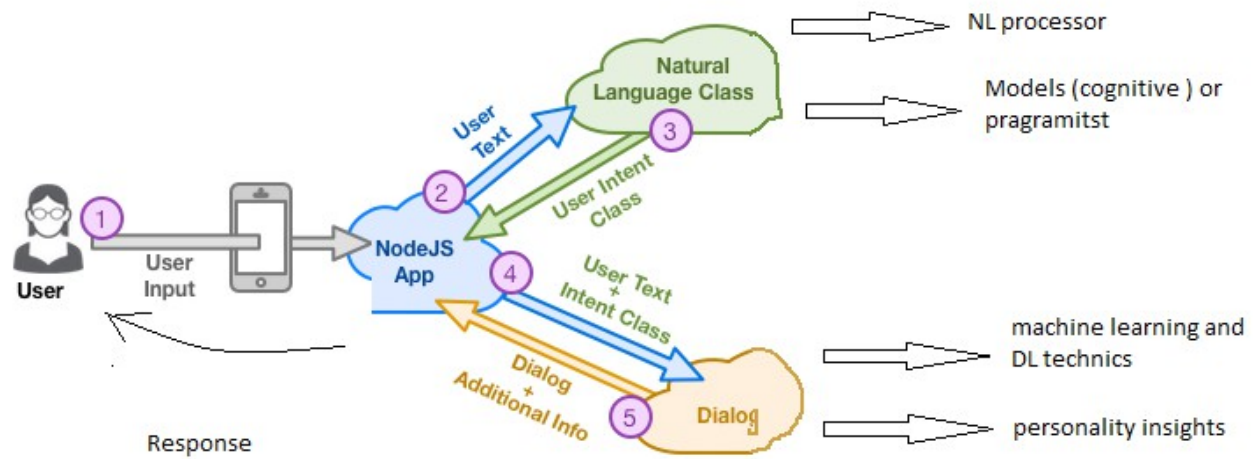
like for example the one used by watson cognitive services

```
1  "big5": {
2    "Openness": "Openness to experience. Higher: Intellectually curious, emotionally-aware, sensitive to beauty and willing to try new things.\nLower: Preferring the plain, straightforward",
3    "Conscientiousness": "Higher: More self-disciplined, dutiful, or aiming for achievement against measures or outside expectations.\nLower: More likely to prefer the spontaneous over",
4    "Extraversion": "Higher: More energetic and pronounced engagement with the external world. Likes high group visibility, talking, and asserting themselves.\nLower: Needs less stimulation",
5    "Agreeableness": "Higher: Value getting along with others. They have a more optimistic view of human nature.\nLower: Value self interests over others. They are more skeptical of others",
6    "Emotional range": "This demo cannot diagnose a mental illness. Higher: More likely to have negative emotions or get upset. It could mean they are going through a tough time.\nLower: Value self interests over others. They are more skeptical of others",
7    "Adventurousness": "Eagerness to trying new activities and experiencing new things.",
8    "Artistic interests": "Appreciation for art and beauty, both man-made and in nature.",
9    "Emotionality": "Emotional availability; awareness of own feelings.",
10   "Imagination": "Openness to creating an inner world of fantasy.",
11   "Intellect": "Intellectual curiosity; openness to new ideas.",
12   "Authority-challenging": "Openness to re-examine own values and traditions; readiness to challenge authority.",
13   "Achievement-striving": "The need for personal achievement and sense of direction.",
14   "Cautiousness": "Tendency to think things through before acting or speaking.",
15   "Dutifulness": "Sense of duty; amount of emphasis placed on fulfilling obligations.",
16   "Orderliness": "Personal organization, tidiness, neatness.",
17   "Self-discipline": "Will-power; the capacity to begin tasks and follow through to completion in spite of boredom or distractions.",
18   "Self-efficacy": "Belief in one's own competence.",
19   "Activity level": "Pace of living; level of busyness.",
20   "Assertiveness": "Forcefulness of expression; pursuit of leadership and social ascendancy; desire to direct the activities of others.",
21   "Cheerfulness": "Tendency to experience or express positive emotions.",
22   "Excitement-seeking": "A need for environmental stimulation.",
23   "Warmth": "Interest in and friendliness towards others; socially confident.",
24   "Gregariousness": "Fondness for the company of others; sociability.",
25   "Altruism": "Active and genuine concern for the welfare of others.",
26   "Cooperation": "Dislike of confrontations. Responding to interpersonal conflict with a willingness to compromise.",
27   "Modesty": "Tendency to be unassuming and play down own achievements; humility.",
28   "Straightforwardness": "Frank and genuine in expression; candid, blunt.",
29   "Sympathy": "Attitude of compassion for others; kindness.",
30   "Trust": "Level of belief in the sincerity and good intentions of others.",
31   "Fiery": "Tendency to experience anger but not necessarily express it as anger or frustration.",
32   "Prone to worry": "Tendency to dwell on difficulty or troubles; easily experience unease or concern.",
33   "Melancholy": "Normal tendency to experience feelings of guilt, sadness, hopelessness, or loneliness. This demo cannot diagnose a mental illness.",
34   "Impulsiveness": "Tendency to act on cravings and urges rather than resisting them or delaying gratification.",
35   "Self-consciousness": "Concern with rejection, embarrassment; shyness.",
36   "Sensitivity to stress": "Difficulty in coping with stress or pressure in difficult situations."
37 },
38 "needs": {
39   "Structure": "A need for organization, planning, and things that have a clear purpose.",
40   "Stability": "A need for the sensible, tried and tested, with a good track record and a known history.",
41   "Self-expression": "A desire to discover and assert one's identity."
42 }
```

and finally make a bot system that gives a response like the one used in api.ai for example

```
{
  "id": "69e47f32-39fe-4c50-b9c0-3d2",
  "timestamp": "2016-08-11T06:10:30.",
  "result": {
    "source": "domains",
    "resolvedQuery": "hey",
    "action": "smalltalk.greetings",
    "parameters": {
      "simplified": "hello"
    },
    "metadata": {},
    "fulfillment": {
      "speech": "Good day!"
    },
    "score": 0
  },
  "status": {
    "code": 200,
    "errorType": "success"
  },
  "sessionId": "9e7f96f9-2948."
}
```

and create a BOT system that contains all those different services and coordinate with them to make one simple use case



you know computers are not smart but the state of the art is to make them look like they are but then this really can be made when meeting with big data to understand different patterns and contexts and create proper models for our different use cases