DROOPI

First-Aid Drone for people in distress in the mountains

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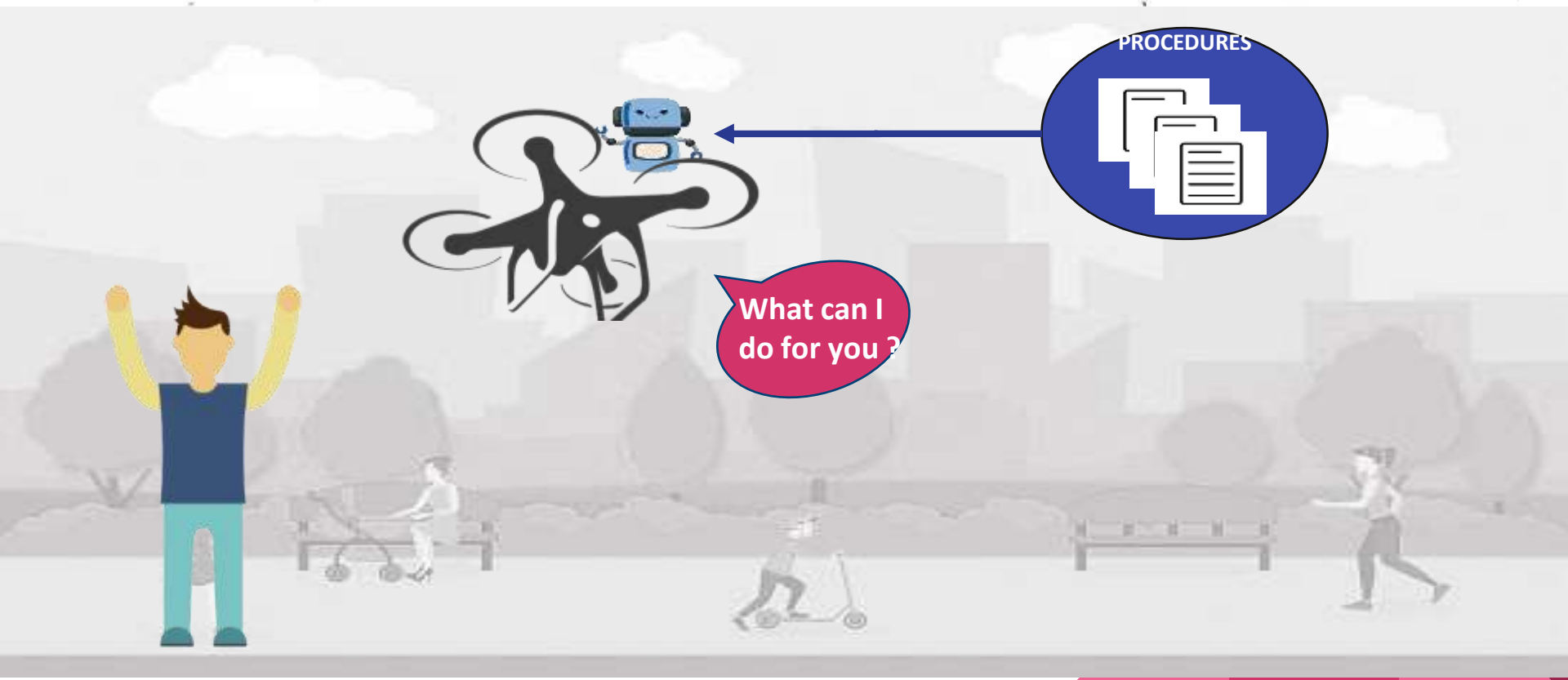
1. Introduction & Context

1- Introduction & Context

- Search and Rescue operations
- Combination with Artificial Intelligence (Computer Vision)

1- Introduction & Context



1- Introduction & Context

- **Drone Positioning :** How to make the drone position itself autonomously in front of a victim.

- **Chatbots for Assistance :** Conduct a conversation with the person by asking him questions to diagnose the situation and send elements to the rescuers in discomfort cases.

2. Related Work

2-1. Related Work : Drones Positioning

No existing solutions for drones positioning in literature !

- Solutions for detect persons from high altitudes
- Solutions to land a drone next to a person for home deliveries
- Solutions to detect a person in distress with PoseNet (SII Solution)
- Estimation of distance between camera and object or persons DisNet

2-1. Related Work : Chatbot

Building a conversational AI Bot has to steps:

- ➢ Data Augmentation:
  - **ReSyf** package : A lexical resource in French for synonyms generation

- ➢ The choice of the tool to use:

  Rasa: One of the best open source frameworks for creating Chatbots:

  - ➔ Well documented
  - ➔ has a local version and an extension option to share the bot with others via its interface Rasa x

3. Proposed Solution

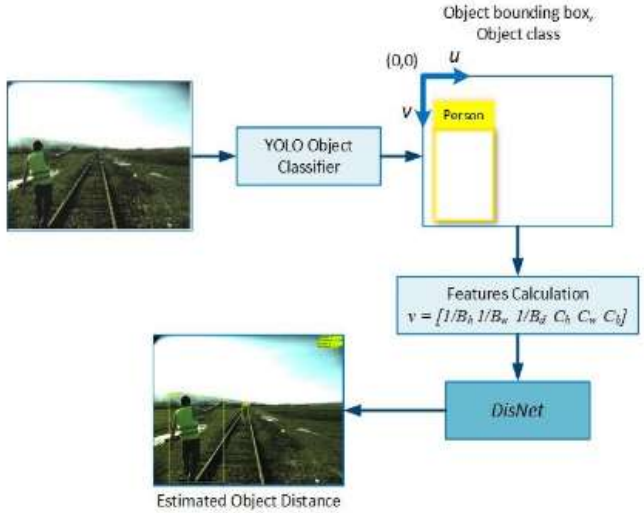
3-1. Proposed Solution : Drones Positioning

To design our solution for drones positioning, we decide to combine some solutions :

YOLO Architecture

Extended Kalman Filter

DisNet +

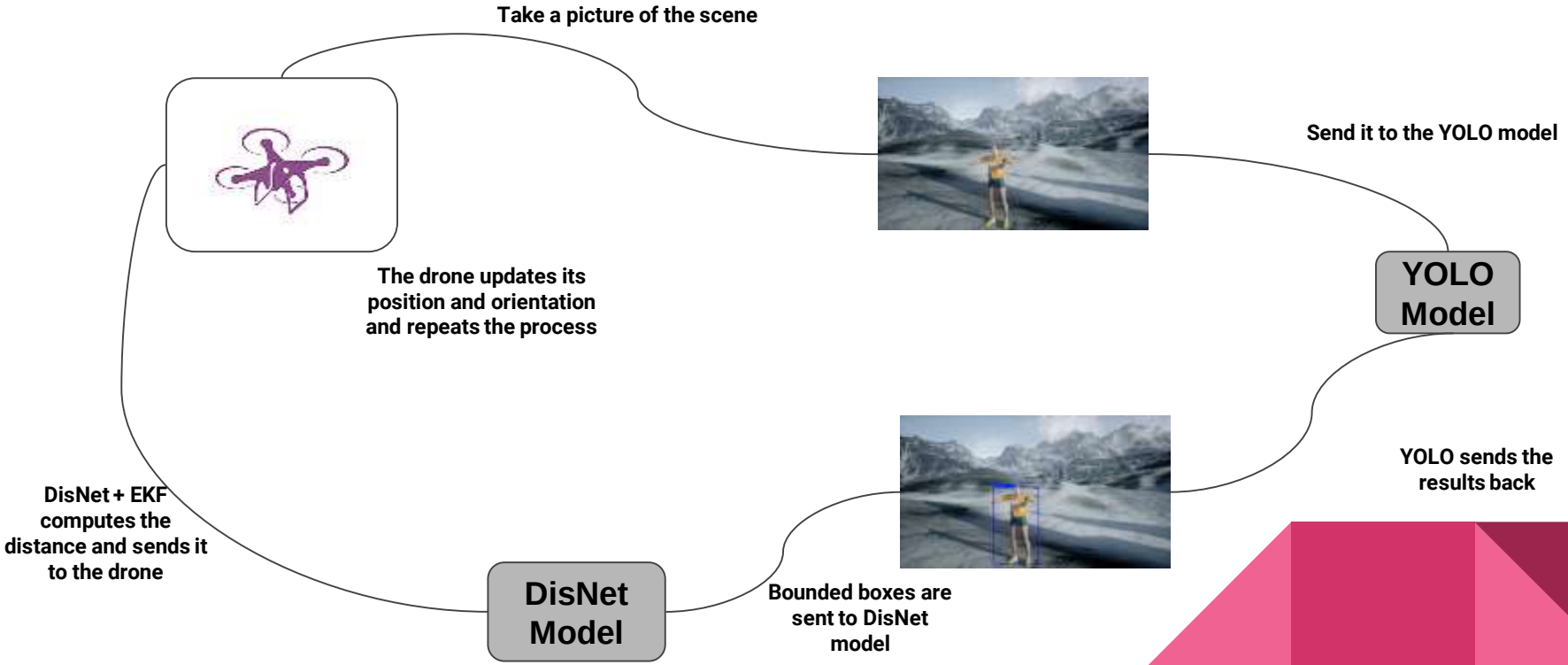


3-1. Proposed Solution : Drones Positioning

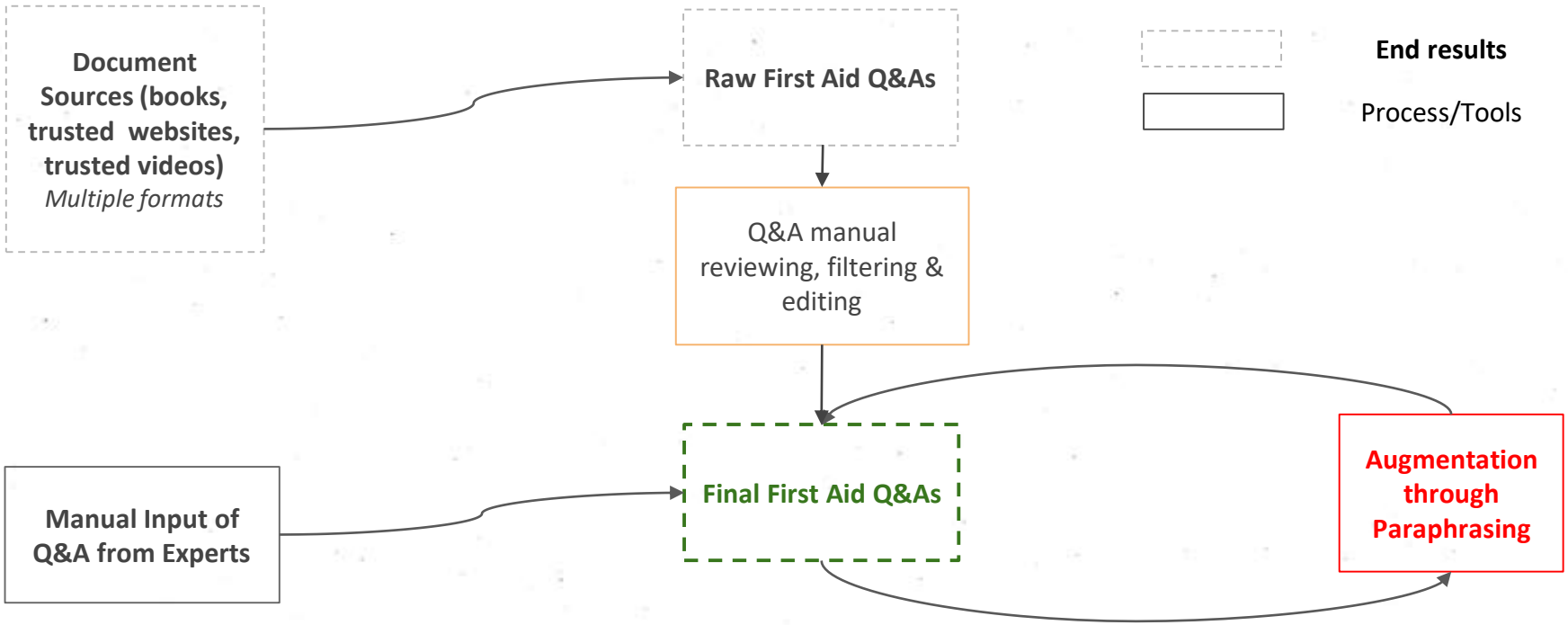
Environment of development & simulation:

- AirSim
- Unreal Engine + Mixamo
- TensorFlow
- Python

3-1. Proposed Solution : Drones Positioning



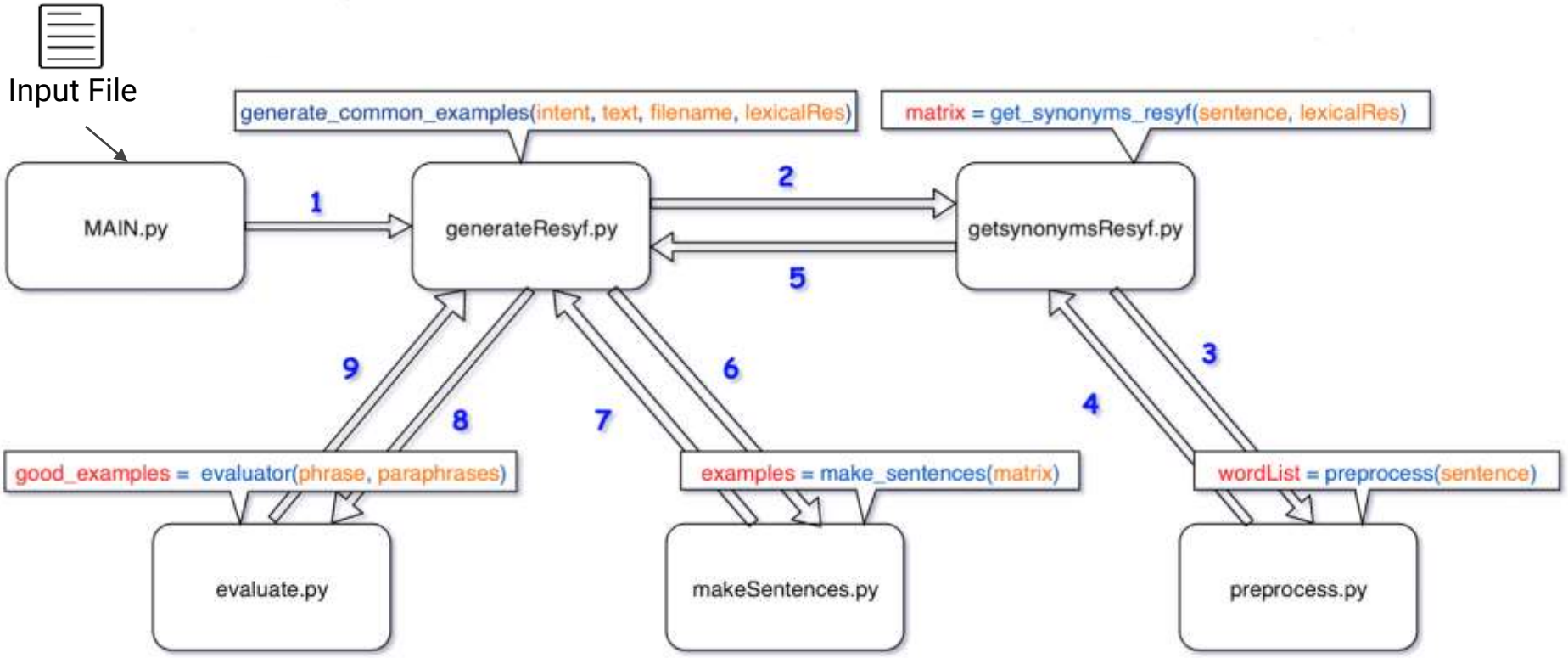
3-2-1. Proposed Solution : Data Collection



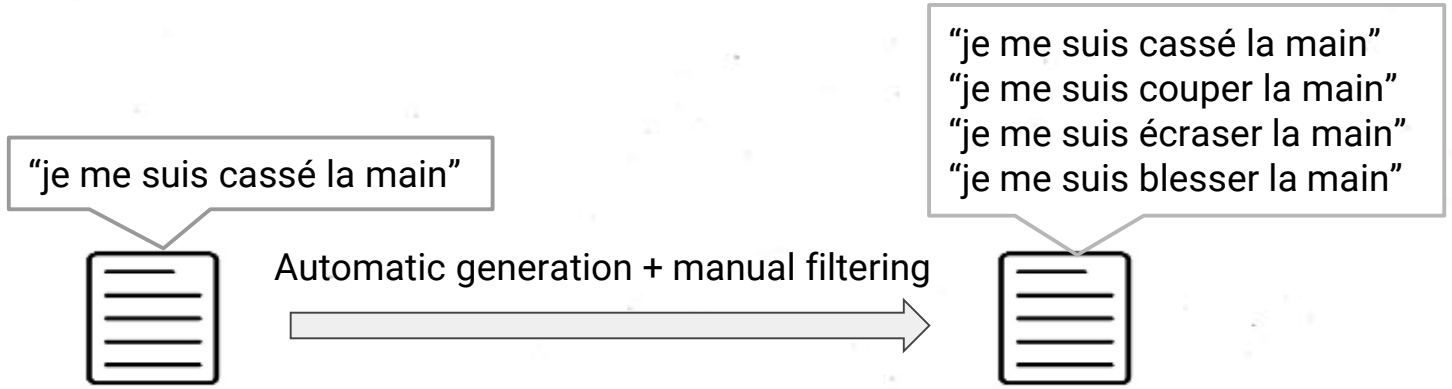
3-2-1. Proposed Solution : ReSyf

ReSyf is a lexical resource in French with graduated synonyms according to their level of difficulty

3-2-1. Proposed Solution : Data Augmentation



3-2-1. Proposed Solution : Data Augmentation

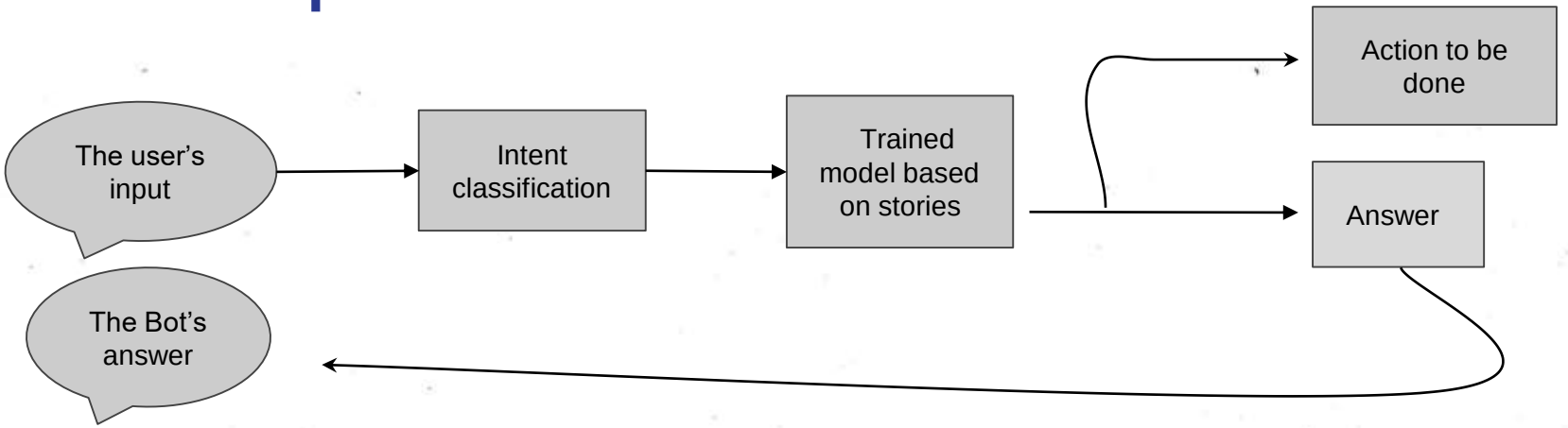


About 110 examples

About 170 examples (+50 %)

By Changing some parameters we reach more than 500 examples but less pertinents

3-2-2. Proposed Solution : Chatbot



Examples:

The user's input: "Au secours"

The Intent: Malaise

The predicted answer: "Quel est votre problème ?"

The user's input: **"**je me suis cassée la jambe"

The Intent: "Explication du malaise"

Action: Adding the discomfort description to file to be send to the rescuers.

The predicted answer: "Est ce que vous saigner ?"

3-2-2. Proposed Solution : Chatbot

Use case's of the prototype:

- Discomfort situation: The Bot conduct a conversation with the person by asking him couple of questions, and tell him what to do while waiting for rescuers to arrive.

For example: In the case of profuse bleeding, The answer of the bot will be:

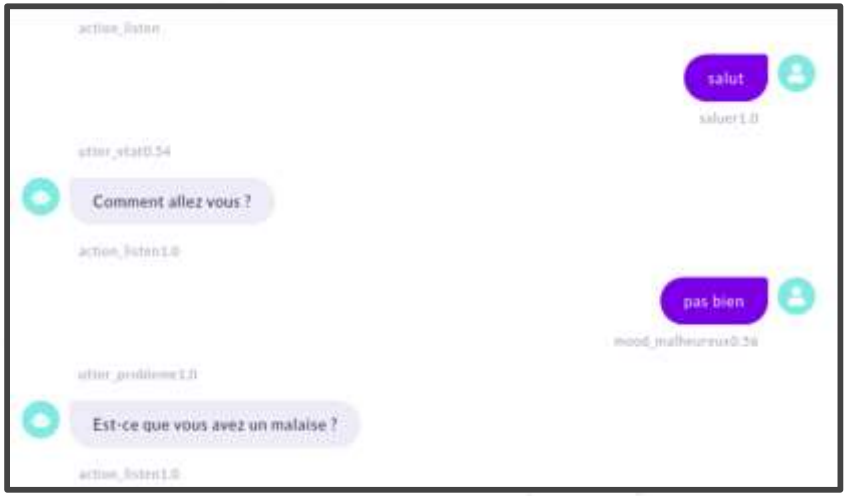
"Comprimez le plus fort possible, si un corps étranger se trouve dans la plaie n'appuyez pas dessus, surtout ne le retirez pas. Ne prenez ni eau ni médicaments"

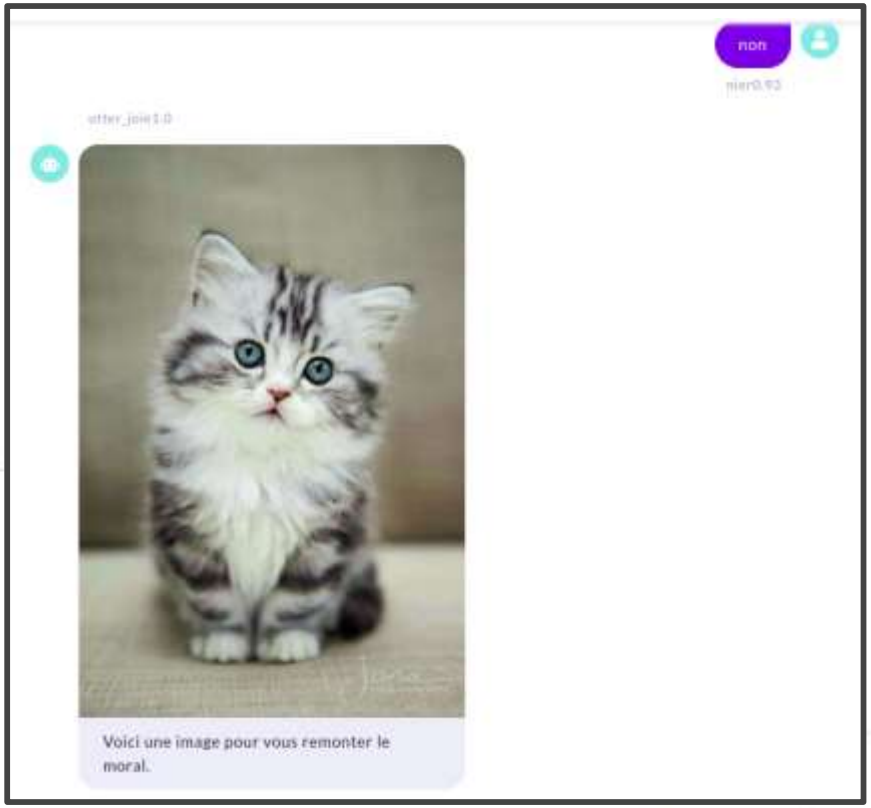
3-2-2. Proposed Solution : Chatbot

- Curiosity about the drone:

3-2-2. Proposed Solution : Chatbot

- Chitchating:





4. Results

4-1. Results : Demonstration

Go to the video

4-2. Limits : Drones Positioning

- Simplified hypothesis : Detection on day, victims standing
- Experiments performed only in a simulation environment
- YOLO model makes some misdetections
- Accuracy of DisNet model depending on the size and the orientation of the victims

4-3. Limits : Chatbot

- As any trained model, it may made wrong intent classification given the variety of ways a person can express an idea
- The paraphrasing generation sometimes selects synonyms which, in the context of the statement, do not make sense or are unnatural. In addition to conjugation issues.

5. Conclusion

5. Conclusion & Future work

- **For the Positioning part:**
  - ➢ Use Reinforcement Learning for better performance
  - ➢ Use lighter and easier to ship models
  - ➢ Develop a system capable of operating at higher altitudes and in bad weather conditions
- **For the Chatbot part:**
  - ➢ Combine the code with Google Maps Api to get the localisation of the person
  - ➢ Add an audio-to-text transcription to the chatbot
  - ➢ Add an option to talk directly with the rescuers if the person is not able to have efficient conversation with the ChatBot
  - ➢ Use PPDB in addition to ReSyf for paraphrases generation

Thank You !