

Taboo Game-like: Project

Intelligent Interfaces

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INTRODUCTION

Taboo Game: Reminder



WORD

You cannot say:

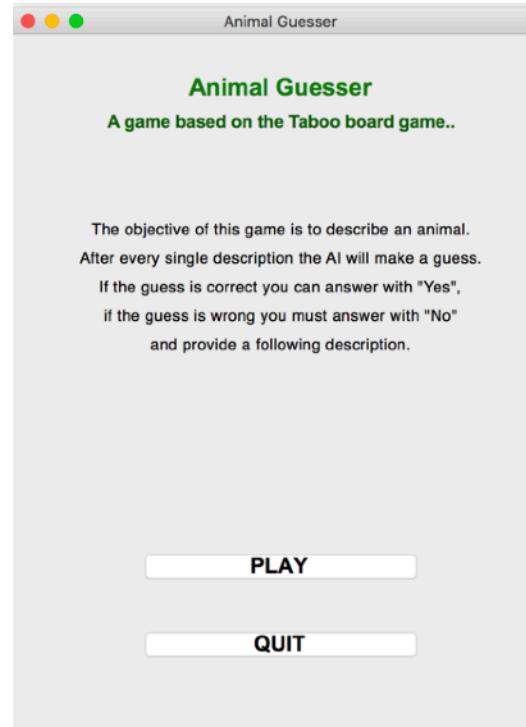
- Word 1
- Word 2
- Word 3

INTRODUCTION

Taboo Game-like

How to play?

1



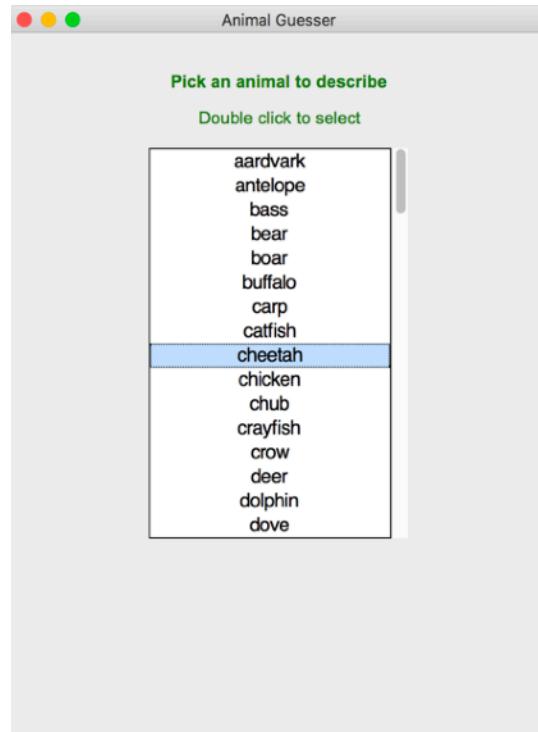
User presses **PLAY** button

INTRODUCTION

Taboo Game-like

How to play?

2



User selects animal
in the dropdown list
retrieved from **ElasticSearch database**

DATABASE



elasticsearch

- NoSQL / Document based
- RESTful API
- Schema free
- Advanced search features
- Libraries for python

DATABASE



elasticsearch

NLP FEATURES:

- Tokenization



Matching &
Dynamic scoring

- Analyzers



Pre-processing

here we used **4 filters**: lowercase, english stop-words,
english stemmer and possessive english stemmer

here we used **ES Standard tokenizer**
(based on Unicode Text
Segmentation algorithm)

DATABASE

kaggle

Zoo Animal Dataset
Structured

99
Animals

A animal_n...	# hair	# feathers
aardvark	1	0
antelope	1	0
bass	0	0
bear	1	0



WIKIPEDIA

Animal page corpus
Unstructured

18
Features

Antelope

From Wikipedia, the free encyclopedia

This article is about the herbivorous mammals. For other uses, see Antelope (disambiguation).

The term **antelope** is used to refer to many species of even-toed ungulates in the family Bovidae.

Antelopes comprise a [wastebasket taxon](#) (miscellaneous genera) in the infraorder Pecora. A group of antelope is called a herd.

Unlike deer [antlers](#), which are shed annually, antelope horns are permanent.

FRONT-END

Taboo Game-like

How to play?

3

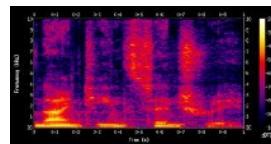


User presses the **DESCRIBE** button and starts describing the animal without saying the **Taboo words**

BRAIN ASPECT 1

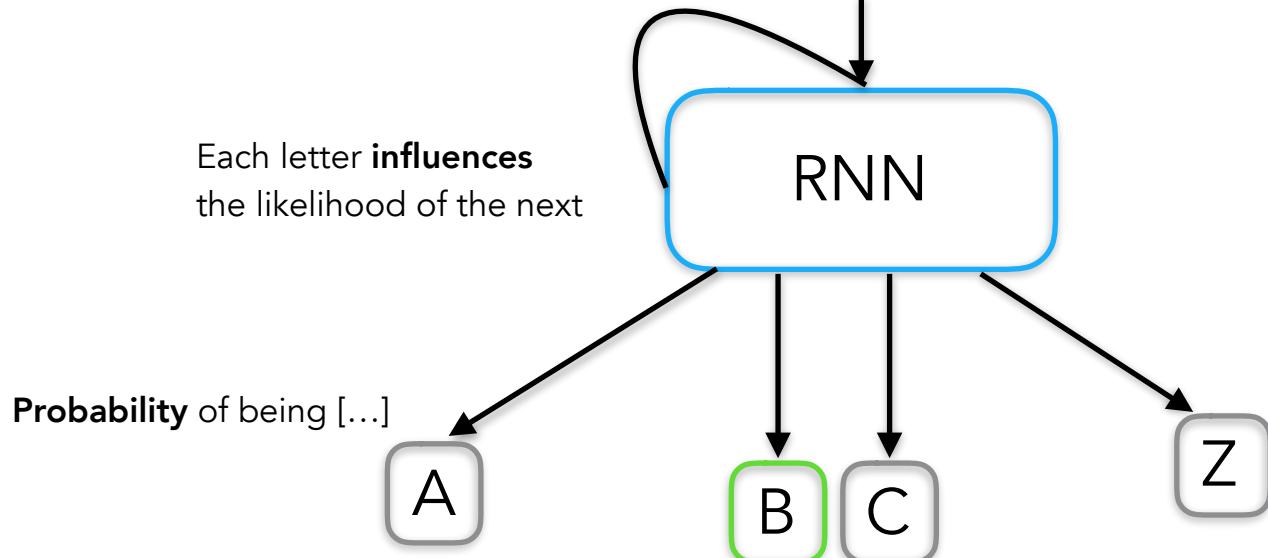
Speech Recognition

How does it work?



Input **spectrogram** spoken letter
(audio slice of 20-40ms)

Each letter **influences**
the likelihood of the next



BRAIN ASPECT 1

Speech Recognition

Speech Recognition as a Service

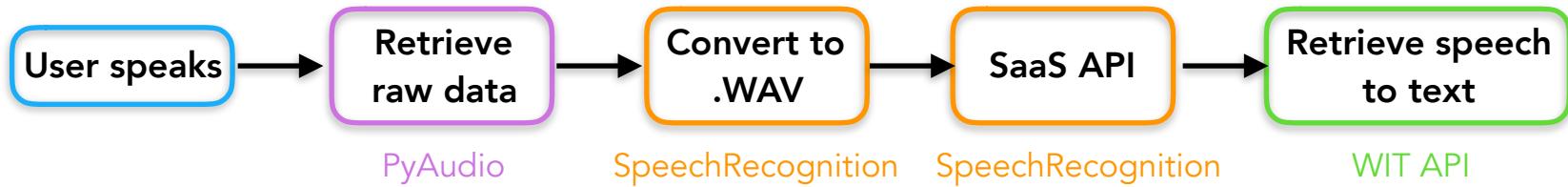
No account needed	Free	Audio streaming	Unlimited API call



BRAIN ASPECT 1

Speech Recognition

Using SpeechRecognition and PyAudio python libraries

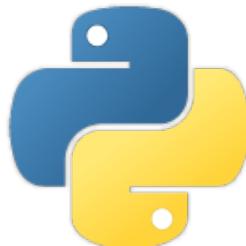


FRONT-END

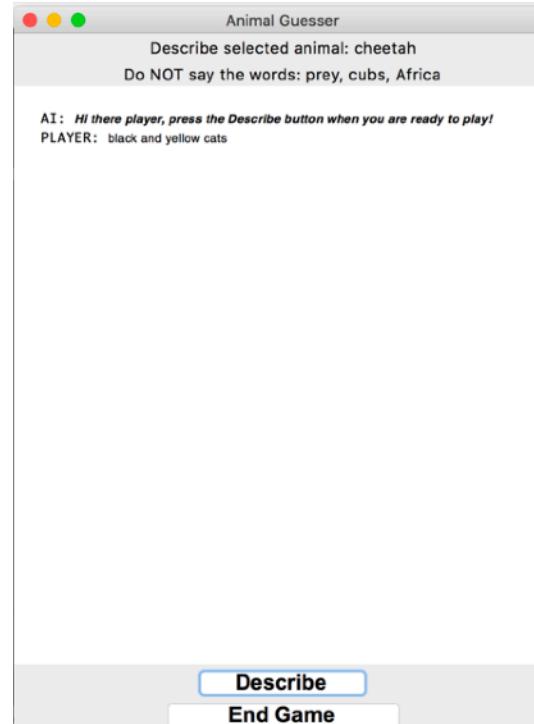
Taboo Game-like

How to play?

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Tkinter



The **text** is displayed on the Chatbox and **NLP** can be used to guess the animal

BRAIN ASPECT 2

Natural Language Processing

Three strategies explored: Strategy 1

Convert text file for each animal **to vector** (bag of words, `sklearn.CountVectorizer`, `sklearn.TfidfVectorizer`) and compare spoken text from player with labeled data (**cossine similarity**)

⊖ CONS

- ⊖ Need access to full dataset
- ⊖ Limited game dynamics
(requires recomputation
of the transformation and update
of each animal vector)
- ⊖ Transformation of input text
adds complexity

⊕ PROS

- ⊕ Quick and robust calculation

BRAIN ASPECT 2

Natural Language Processing

Three strategies explored: Strategy 2

Using **Elastic Search** built-in **NLP engine**, with customized text analyzer, to query string data for each animal stored in its online server

CONS

-  Requires online access
-  More black box
(difficult to personalize searching algorithm specific to the taboo game)

PROS

-  Quick and efficient results
-  High game dynamic
(interactive loading of players descriptions on the server)

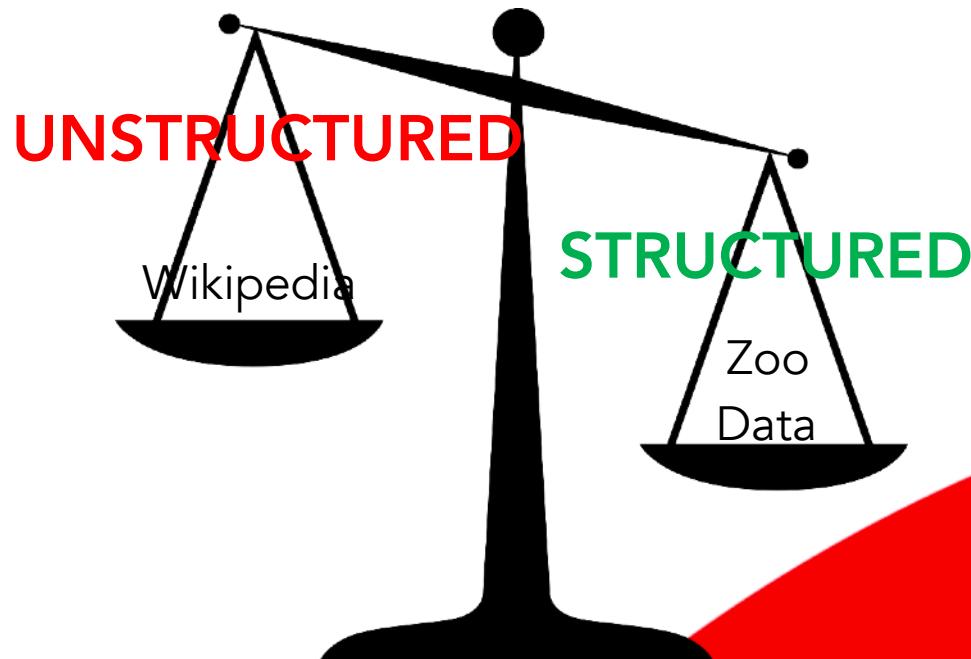
BRAIN ASPECT 2

Natural Language Processing

Pushing strategy 2: only-Elastic

Through **weighted scoring of transformed & processed** zoo and Wikipedia dataset based on full text search

- Can contain irrelevant data
- Lesser quality = needs more pre-processing



- + Better quality
- + Stronger indicator

BRAIN ASPECT 2

Natural Language Processing

Three strategies explored: Strategy 3

Training a Neural Network on Elastic Search online dataset. The neural network can be accessed locally or online.

CONS

-  Model has to be retrained on newly added data

PROS

-  Offline&online access to the trained model
-  New samples gathered by playing the game
-  Sensitive to NL nuances

BRAIN ASPECT 2

Natural Language Processing - results

Description

['White plumage']

'sparrow': 20.5, 'gull': 20.5, 'penguin':
20.1, 'wren': 20.1, 'dove': 18.7

['White plumage', 'long neck']

'[swan'skua': 19.6, 'duck': 19.6](#)

['White plumage', 'long neck', 'Big
Bird']

'duck': 21.7, 'rhea': 21.5, 'flamingo':
19.9, '[swan](#)

['White plumage', 'long neck', 'Big
Bird', 'lives in the water']

'duck': 21.6, 'rhea': 21.0, 'flamingo':
20.0, '[swan](#)

['White plumage', 'long neck', 'Big
Bird', 'lives in the water', 'Ugly
duckling']

'[swan'flamingo': 15.2, 'pike': 15.1](#)

Elastic Search

Classifier models

'duck': 32.4, 'skimmer': 23.0, 'penguin':
15.4, 'wren': 15.1, 'gull': 14.2

'giraffe': 30.9, 'skua': 19.5, 'rhea': 17.6,
'duck': 17.4, 'skimmer': 14.6

'giraffe': 26.6, 'skua': 22.6, 'duck': 18.6,
'rhea': 18.0, 'skimmer': 14.1

'duck': 30.9, 'skua': 20.2, 'penguin':
16.7, 'rhea': 16.3, 'skimmer': 15.9

'[swan'pheasant': 15.0, 'skimmer': 14.8,
'penguin': 14.5](#)

BRAIN ASPECT 2

Natural Language Processing - results

Description	Elastic Search	Classifier models
['Lives in the north']	'crayfish': 20.1, 'newt': 20.1, 'puma': 20.0, 'buffalo': 20.0, 'raccoon': 19.9	'sole': 32.3, 'slowworm': 17.9, 'reindeer': 17.5, 'cat': 16.4, 'goat': 15.9
['Lives in the north', 'has hooves']	'lynx': 24.8, 'reindeer': 22.2, 'kiwi': 21.6, 'pony': 16.0, 'buffalo': 15.5	'reindeer': 34.5, 'lynx': 23.5, 'fruitbat': 14.2, 'slowworm': 13.9, 'cat': 13.8
['Lives in the north', 'has hooves', 'Santa Claus']	'reindeer': 31.6, 'deer': 20.6, 'lynx': 16.6, 'goat': 16.5, 'kiwi': 14.5	'reindeer': 42.4, 'goat': 17.6, 'lynx': 15.2, 'fruitbat': 12.7, 'pony': 12.1

Taboo words: Caribou, Antlers, Tarandus

BRAIN ASPECT 2

Natural Language Processing

Three strategies explored: Comparison

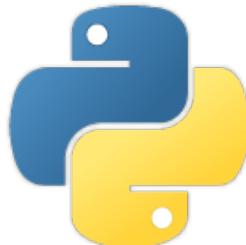
	Offline possible?	Adding new info	Dynamic updating	Requires data transformation
Strategy 1: Vector similarity on full string dataset	Yes (when all data available)	Restructure existing data	Low	Yes
Strategy 2: Elastic Search querying (full online platform)	No (unless all data stored locally)	Restructure existing data	High	No
Strategy 3: Trained classifier model on labeled data	Yes (when trained model available)	Easy (add new labeled data)	Medium*	Yes

FRONT-END

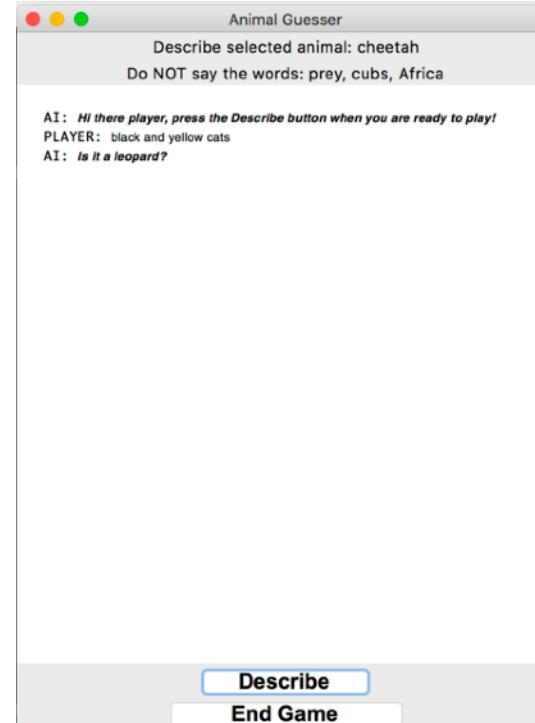
Taboo Game-like

How to play?

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Tkinter



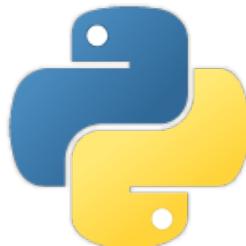
Agent makes its first **guess**

FRONT-END

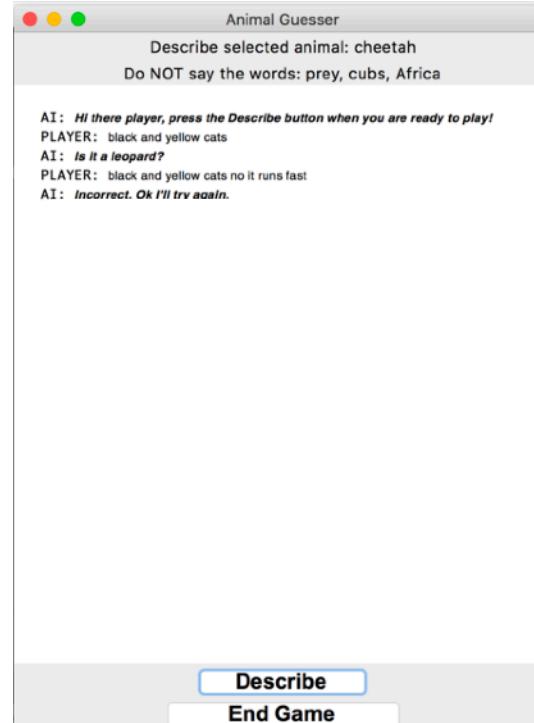
Taboo Game-like

How to play?

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Tkinter



If agent is wrong, player provides more info and we go back to step 3

FRONT-END

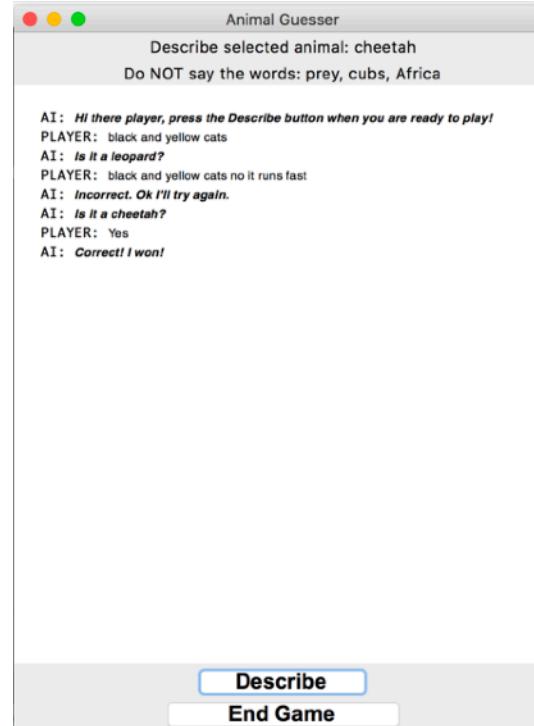
Taboo Game-like

How to play?

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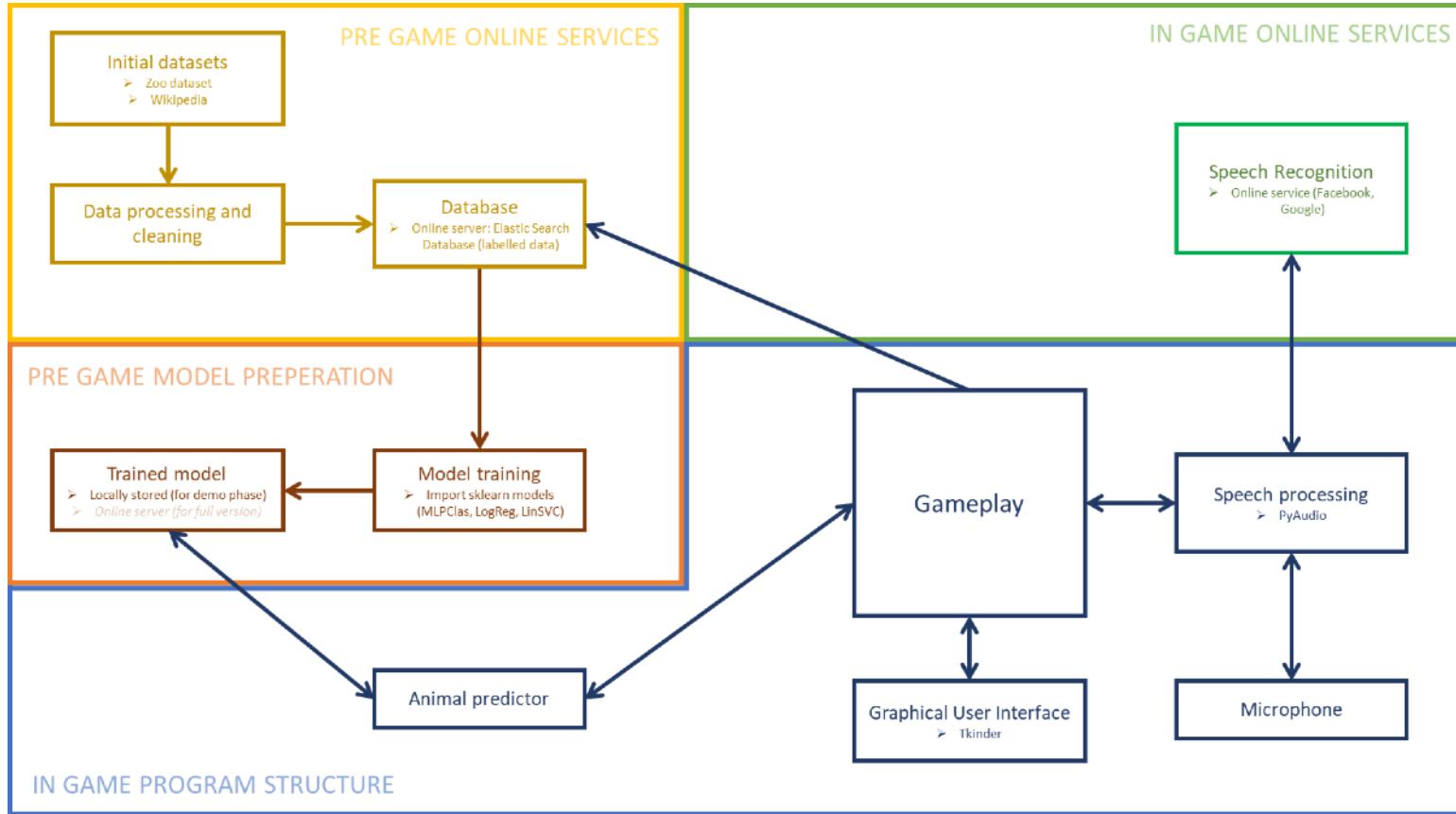


Tkinter



The **game goes on** until the agent makes the **correct guess** (the player says yes), if **30s** has passed or if player says a taboo word

BEHIND THE SCENES



POSSIBLE IMPROVEMENTS

- ✓ Update of the taboo words based on player's description (to make them human-based)
- ✓ Integrating animal guessing capabilities as memory assisting feature for Alexa/Cortana/Siri
- ✓ If the player made the agent guess correctly, another card is chosen and the player has 30s to make the agent guess as many cards as possible
- ✓ Make a scoring table to display the accumulated points of the player
- ✓ Develop the counter-game, where the agent describes and the player guesses
- ✓ Add more categories (not only animals but things, countries, etc.)

THANK YOU FOR YOUR ATTENTION!