



UNIVERSITÀ
DI SIENA
1240

DEPARTMENT OF INFORMATION ENGINEERING AND MATHEMATICAL SCIENCES

F-ONE

**AUTOMATIC TEXT GENERATION WITH DEEP
LEARNING MODELS:
A CHATBOT BASED APPLICATION**

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OBJECTIVE

*This project aims to develop an
Emotional Chatbot AI
Question & Answer Text-Generation Knowledge-based
capable of managing conversations with users.*

Chatbot AI



Emotional



Question & Answer
Knowledge-based



Text-Generation





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Filippo Florindi

THE CHATBOT'S DOMAIN OF EXPERTISE



FIA F1 REGULATIONS

- **Sporting** Regulations
- **Technical** Regulations
- **Financial** Regulations



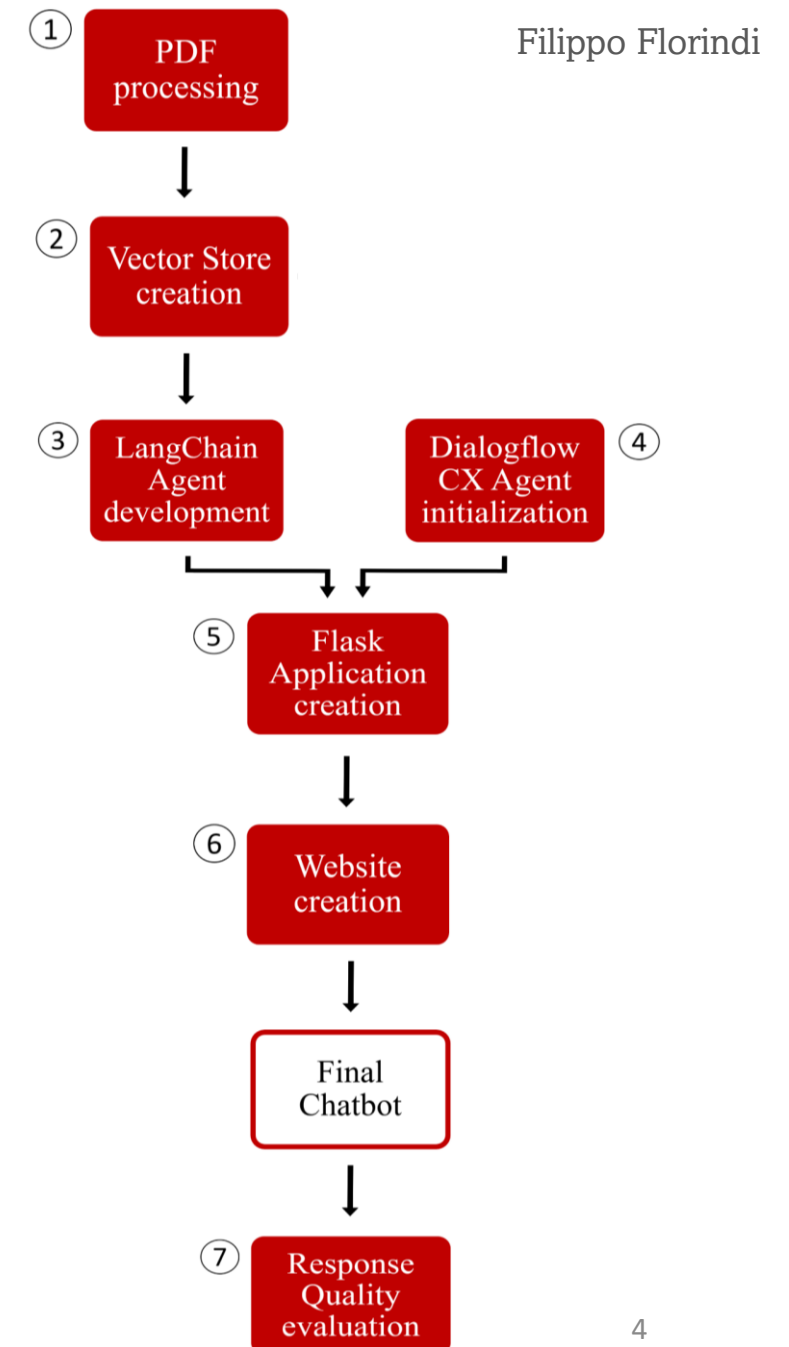
FORMULA 1 INFO

- Drivers
- Teams
- Circuits
- Grand Prix Results
- Latest News
- Historical Events



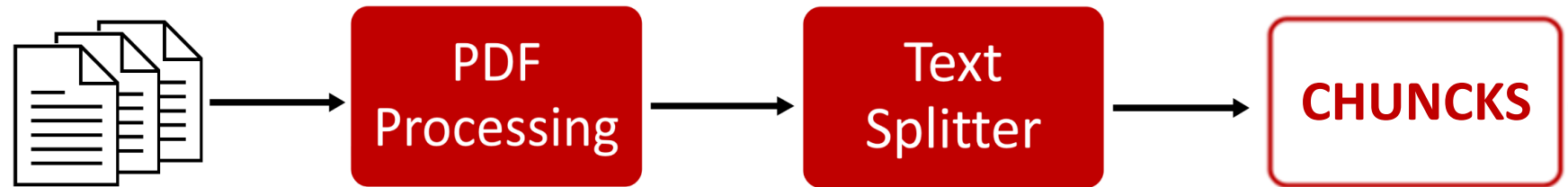
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THE F-ONE DEVELOPMENT PROCESS



1. PDF PROCESSING

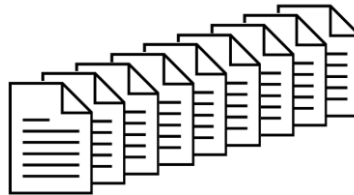
F1 Regulations



Algorithm extracting:

- Chapters
- Paragraphs
- Subparagraphs
- Information Content Blocks

Document Creation

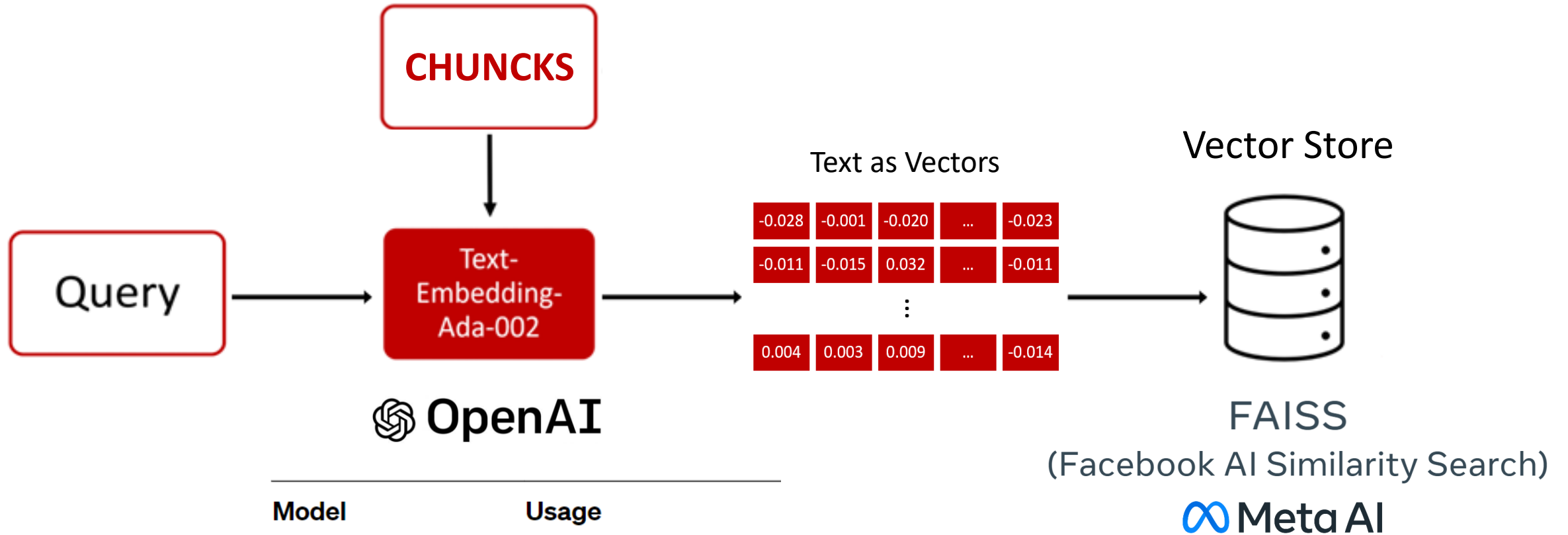


Each containing an **Information Content Block**.

Metadata:

- PDF Title
- Page Number
- Chapter
- Paragraph (if any)
- Subparagraph (if any)

2. VECTOR STORE CREATION



Model	Usage
Ada v2	\$0.0004 / 1K tokens

3. LANGCHAIN AGENT DEVELOPMENT

The main components used in the agent are:

A) LARGE LANGUAGE MODEL (LLM):

GPT-3.5-
Turbo

 OpenAI

Model

Usage

gpt-3.5-turbo

\$0.002 / 1K tokens

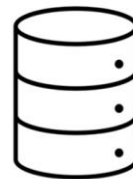
B) AGENT TOOLS:

FAISS

(Facebook AI Similarity Search)

 Meta AI

Vector Store



Google Search
Engine



3. LANGCHAIN AGENT DEVELOPMENT

C) **MEMORY:** **ConversationBufferWindowMemory**  LangChain

D) **EMOTION
DETECTION:**

EmoRoBERTa



27 EMOTIONS + Neutral state:

- | | | |
|---------------|--------------------|-----------------|
| 1. Admiration | 10. Disappointment | 19. Love |
| 2. Amusement | 11. Disapproval | 20. Nervousness |
| 3. Anger | 12. Disgust | 21. Optimism |
| 4. Annoyance | 13. Embarrassment | 22. Pride |
| 5. Approval | 14. Excitement | 23. Realization |
| 6. Caring | 15. Fear | 24. Relief |
| 7. Confusion | 16. Gratitude | 25. Remorse |
| 8. Curiosity | 17. Grief | 26. Sadness |
| 9. Desire | 18. Joy | 27. Surprise |

3. LANGCHAIN AGENT DEVELOPMENT

E) PROMPT

i. System Message :

```
""" You are a helpful Chatbot that answers the user's
questions about Formula 1. Your name is Fone. In addition to
responding and providing correct information, you are able
to use the emotion expressed by the user to respond
sensitively. """
```

ii. Human Message :

iii. System Variable :

```
{Conversational Memory}
```

```
"""
TOOLS
-----
Assistant can use tools to look up information that may be
helpful in answering the users original question. The tools
are:

{{tools}}
-----

RESPONSE FORMAT INSTRUCTIONS
-----
{format_instructions}
-----

USER\'S EMOTION
-----
Here is the user\'s emotion (remember to respond
sensitively according to the user\'s emotion):

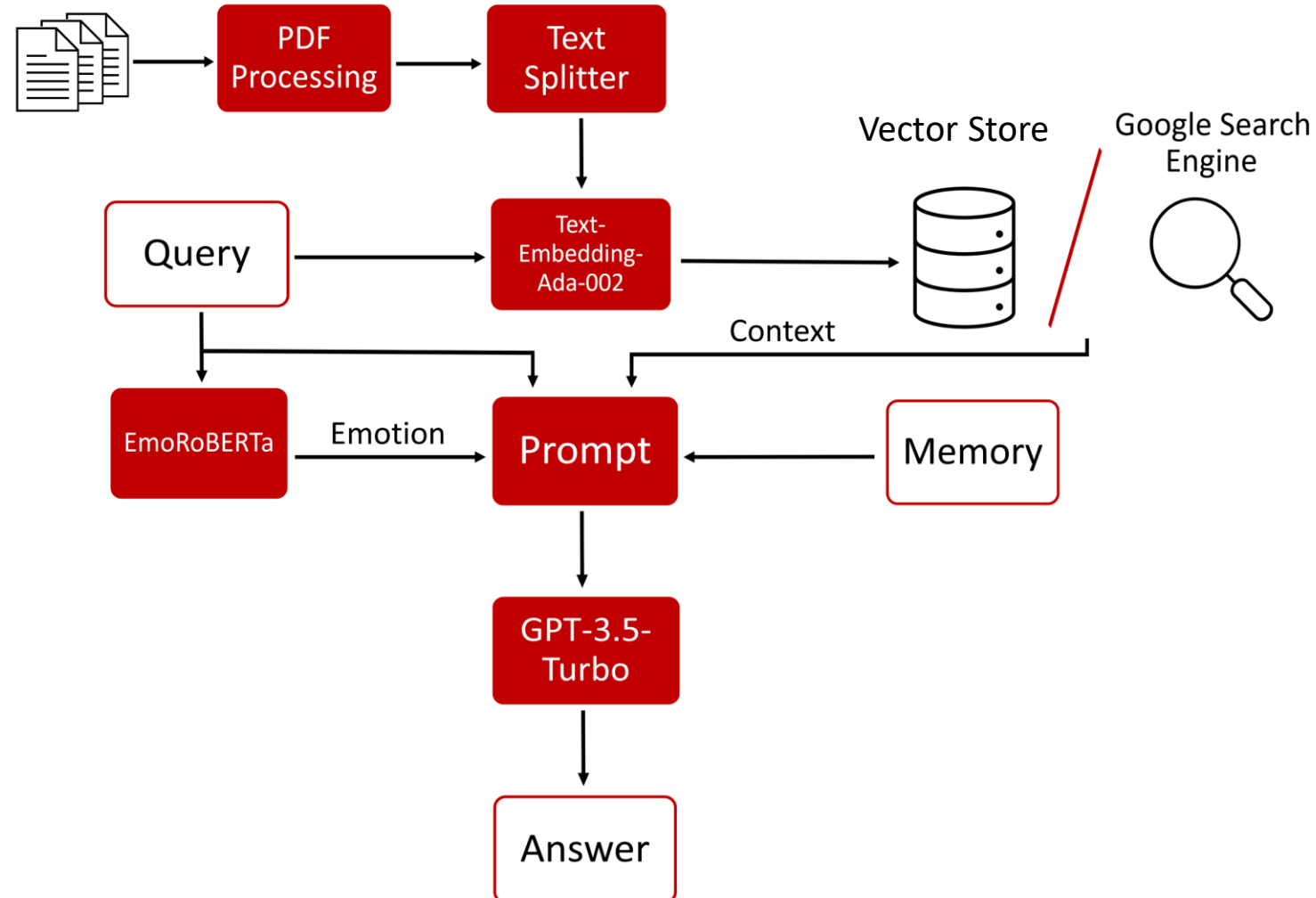
{{{user_emotion}}}
-----

USER\'S INPUT
-----
Here is the user\'s input (remember to respond with a
markdown code snippet of a json blob with a single action,
and NOTHING else):

{{{input}}}
"""
```

3. LANGCHAIN AGENT DEVELOPMENT

F1 Regulations



4. DIALOGFLOW CX AGENT INITIALIZATION



CX Edition
\$0.007 per request

Start Page

Routes +

Default Welcome Intent

Event handlers +

sys.no-match-default

sys.no-input-default

Add state handler



Agent says

Hi, my name is Fone and I'm here to assist you! What you want to know about Formula 1?



Webhook

Enabled

Display name *
f1-webhook

Webhook timeout
30
Enter a number (in seconds)

Type
Generic web service

Webhook URL *
Enter a publicly available HTTPS URL to your webhook

Subtype
Standard



Event handler

No-match default

Fulfillment

Parameter presets

Agent responses

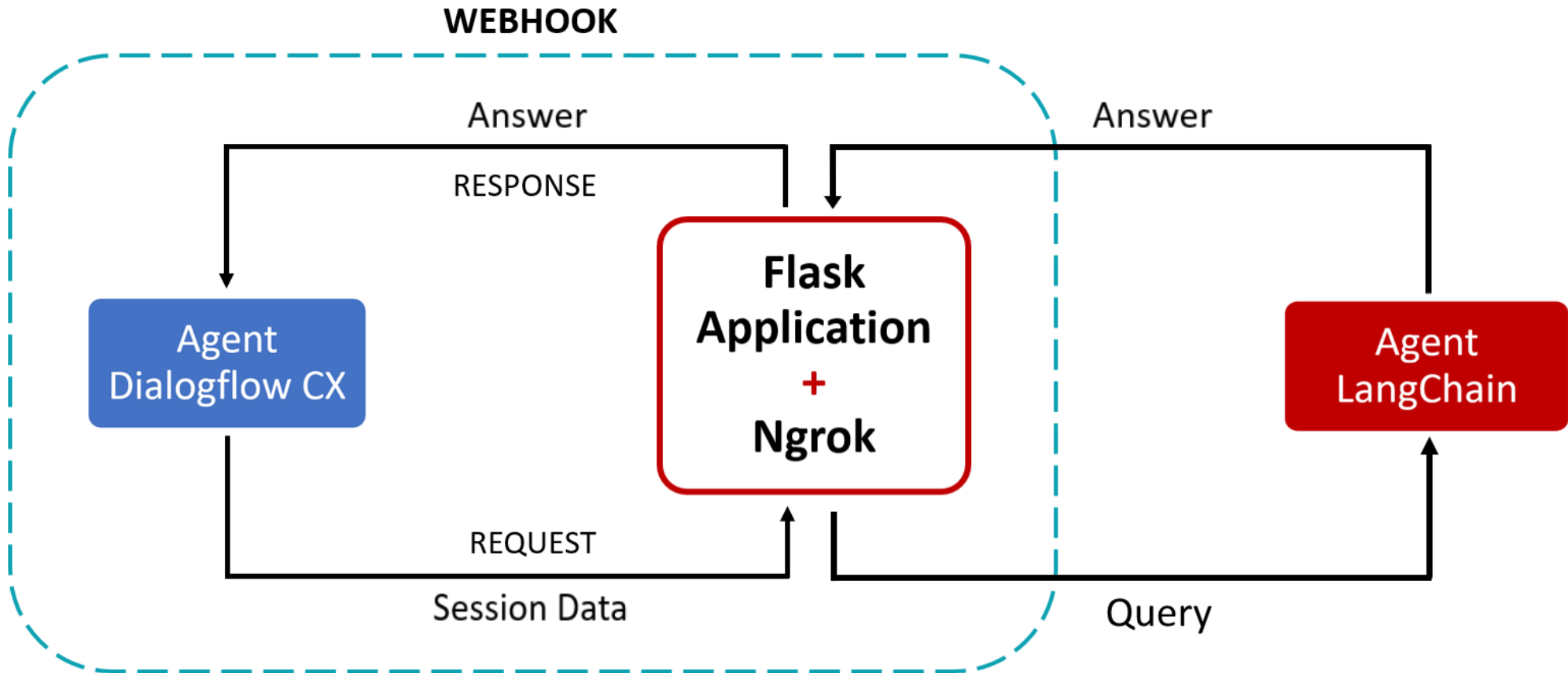
Webhook settings

Enable webhook

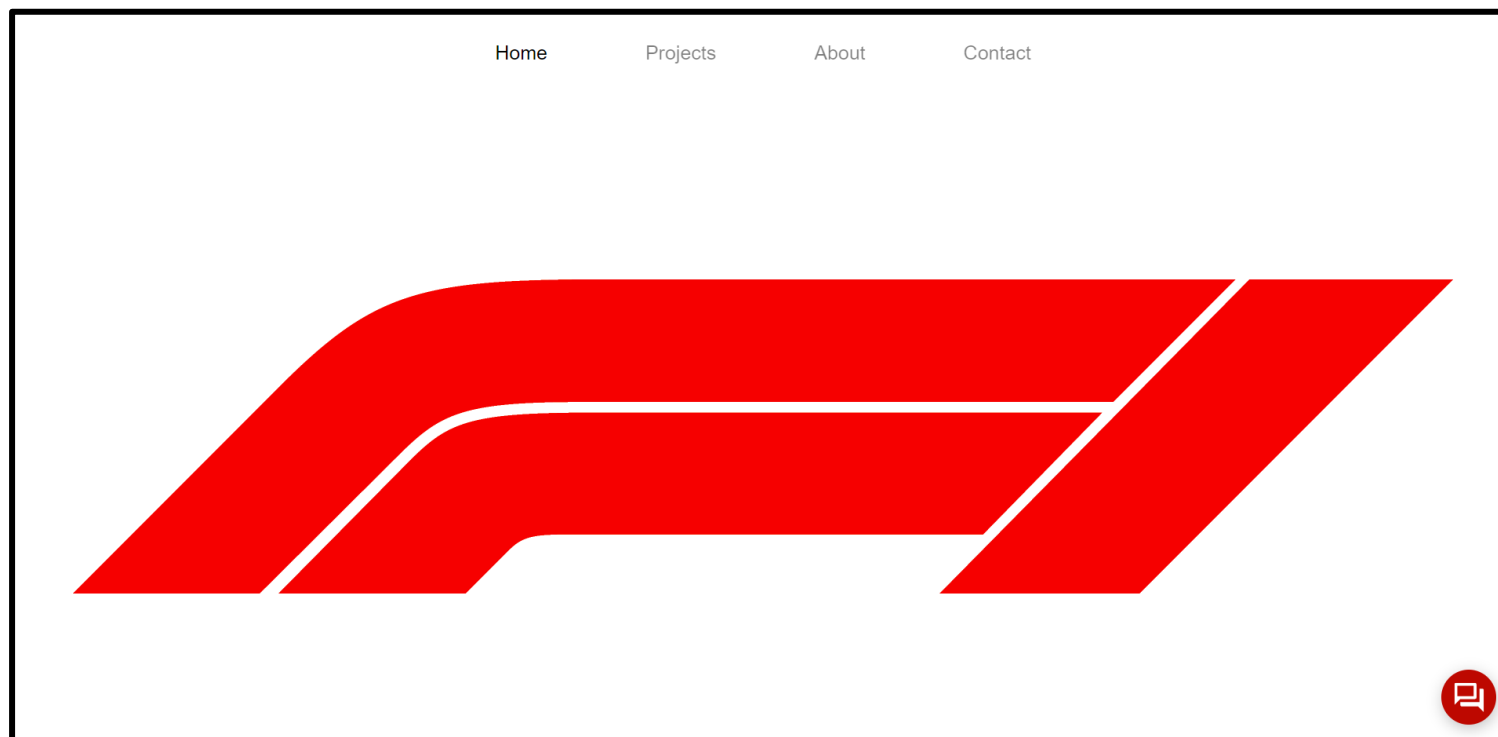
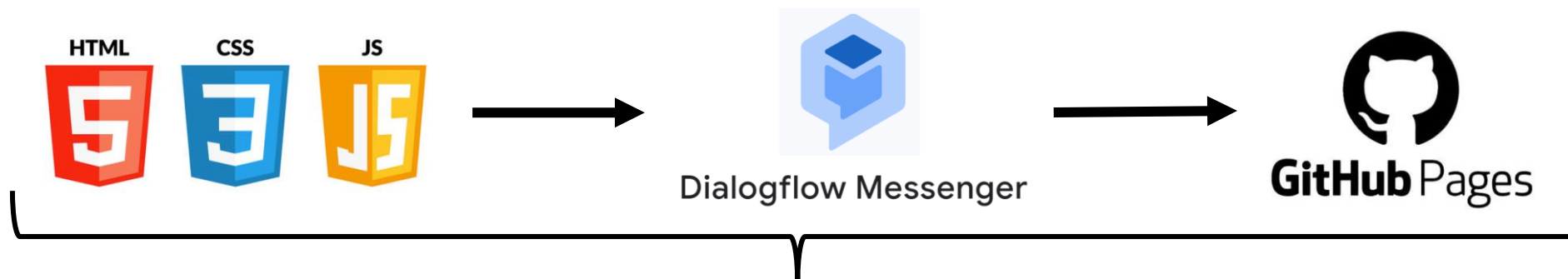
Webhook
f1-webhook

Tag *
f1

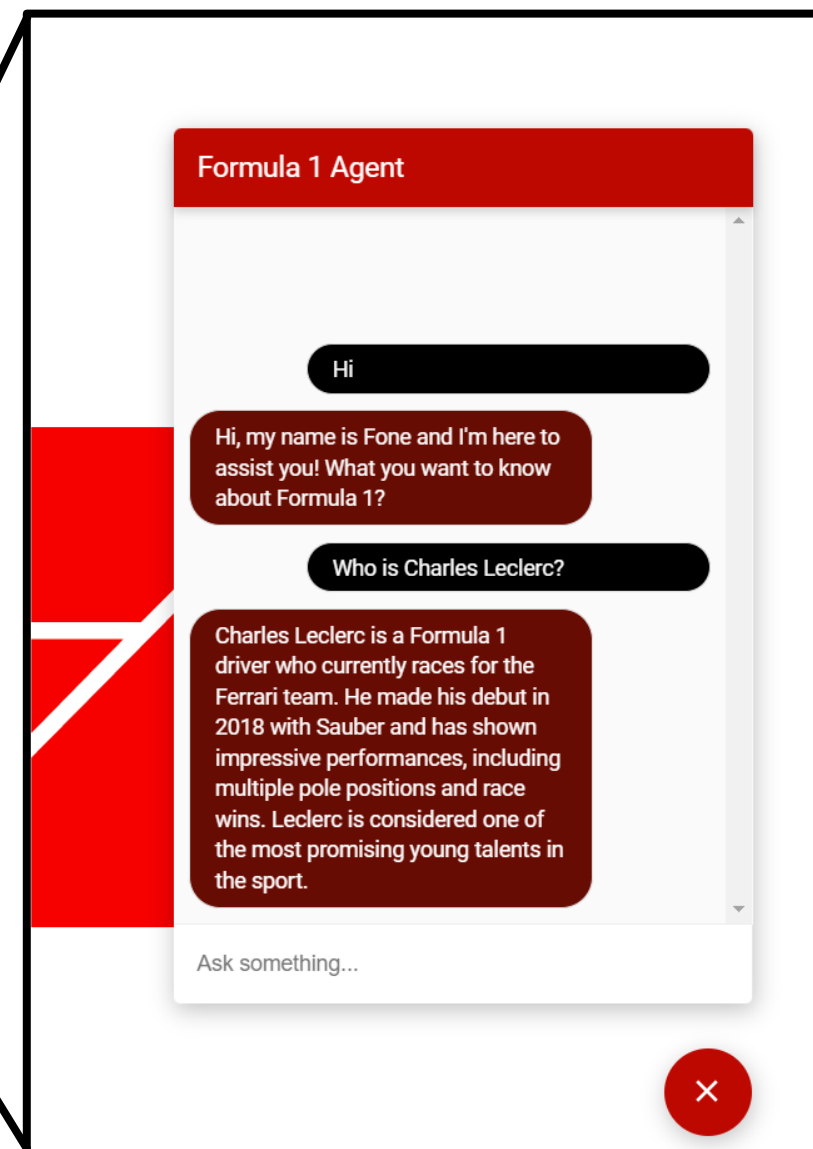
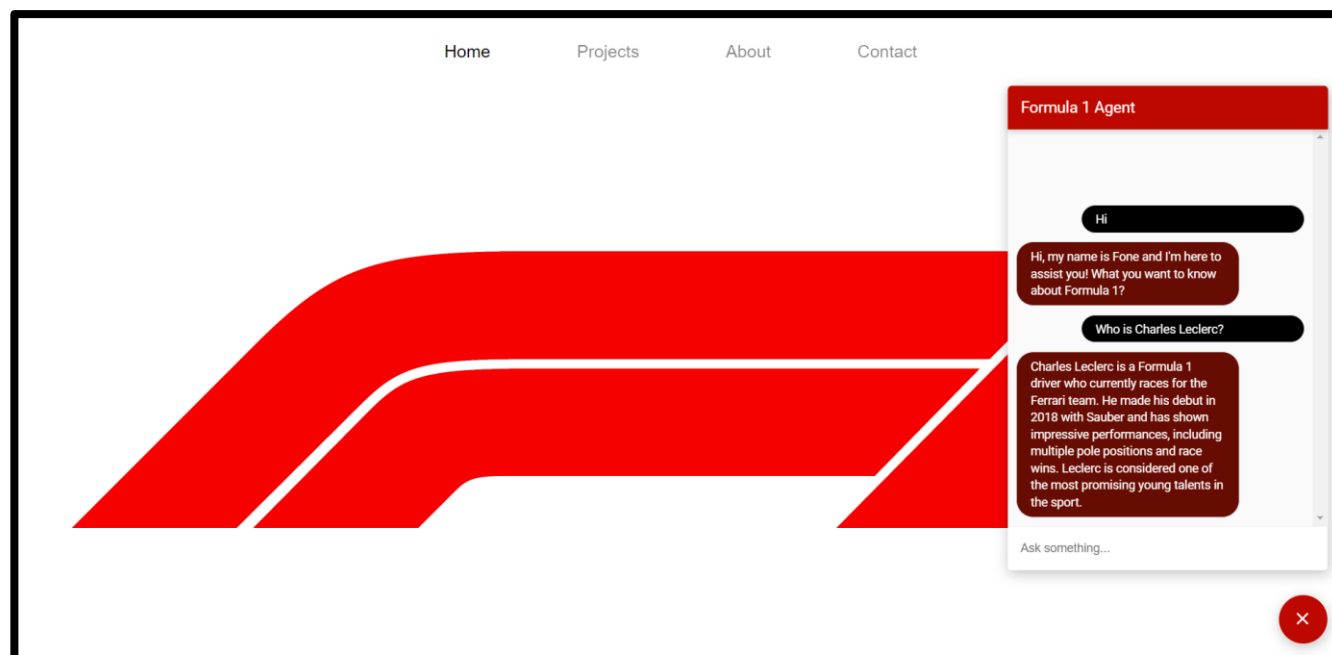
5. FLASK APPLICATION CREATION



6. WEBSITE CREATION



FINAL CHATBOT



7. F-ONE'S RESPONSES QUALITY EVALUATION

FORMULA 1 REGULATION		BERT SCORE	UNIEVAL FACTUAL CONSISTENCY
SPORTING REGULATION	Tuple 1	0.6168	0.922601
	Tuple 2	1.0000	0.976769
	Tuple 3	0.6953	0.535803
	Tuple 4	0.8989	0.866939
	Tuple 5	0.7815	0.798653
	Tuple 6	0.8665	0.971138
	Tuple 7	0.7924	0.898627
	Tuple 8	0.9892	0.859361
	Tuple 9	0.7629	0.661716
	Tuple 10	0.7068	0.937588
Mean Value		0.8110	0.842920
Std Value		0.1264	0.142491

FORMULA 1 REGULATION		BERT SCORE	UNIEVAL FACTUAL CONSISTENCY
TECHNICAL REGULATION	Tuple 1	0.7985	0.53526
	Tuple 2	0.6558	0.638856
	Tuple 3	0.7949	0.505142
	Tuple 4	0.8353	0.933781
	Tuple 5	0.9248	0.719562
	Tuple 6	0.8256	0.769616
	Tuple 7	0.9364	0.524970
	Tuple 8	0.7546	0.709766
	Tuple 9	0.6938	0.615149
	Tuple 10	0.7374	0.585857
Mean Value		0.7957	0.653797
Std Value		0.0901	0.132640

FORMULA 1 REGULATION		BERT SCORE	UNIEVAL FACTUAL CONSISTENCY
FINANCIAL REGULATION	Tuple 1	0.8378	0.950803
	Tuple 2	0.8066	0.441136
	Tuple 3	0.8149	0.903660
	Tuple 4	0.7832	0.826500
	Tuple 5	0.8265	0.500155
	Tuple 6	0.8330	0.905605
	Tuple 7	0.8460	0.719722
	Tuple 8	0.7793	0.553241
	Tuple 9	0.7333	0.831962
	Tuple 10	0.7901	0.756445
Mean Value		0.8051	0.738923
Std Value		0.0343	0.181653

7. F-ONE'S RESPONSES QUALITY EVALUATION

SPORTING REGULATION	FORMULA 1 REGULATION	UNIEVAL	NATURALNESS	COHERENCE	ENGAGINGNESS	GROUNDNESS	UNDERSTANDABILITY	OVERALL
		Tuple 1	0.999783	0.998975	0.998601	0.998027	0.999735	0.999024
		Tuple 2	0.999802	0.999594	0.999724	0.999272	0.999791	0.999636
		Tuple 3	0.999483	0.999747	3.990193	0.998115	0.999558	1.597419
		Tuple 4	0.999707	0.999795	2.997908	0.999584	0.999754	1.399350
		Tuple 5	0.999373	0.999783	4.996338	0.999774	0.999499	1.798953
		Tuple 6	0.999731	0.998614	0.999087	0.999274	0.999686	0.999279
		Tuple 7	0.999731	0.493846	0.998183	0.999274	0.999686	0.898144
		Tuple 8	0.999854	0.999032	1.998449	0.999698	0.999807	1.199368
		Tuple 9	0.996908	0.999564	4.994912	0.999075	0.998883	1.797868
		Tuple 10	0.99985	0.99974	2.994244	0.9998	0.999857	1.398698
Mean Value		1.308774						
Std Value		0.341074						

TECHNICAL REGULATION	FORMULA 1 REGULATION	UNIEVAL	NATURALNESS	COHERENCE	ENGAGINGNESS	GROUNDNESS	UNDERSTANDABILITY	OVERALL
	Tuple 1	0.999791	0.999642	1.998116	0.999153	0.999772	1.199295	
	Tuple 2	0.998755	0.999756	2.996543	0.998717	0.998904	1.398535	
	Tuple 3	0.998676	0.999373	7.989337	0.999812	0.999291	2.397298	
	Tuple 4	0.999573	0.997502	0.999014	0.998881	0.999501	0.998894	
	Tuple 5	0.999251	0.999199	5.978598	0.998864	0.99941	1.995064	
	Tuple 6	0.999588	0.999638	4.997285	0.999381	0.999678	1.799114	
	Tuple 7	0.99978	0.999603	0.999921	0.999805	0.999764	0.999775	
	Tuple 8	0.999625	0.999819	2.998616	0.998462	0.999607	1.399226	
	Tuple 9	0.999771	0.99982	1.998906	0.999861	0.999749	1.199621	
	Tuple 10	0.999804	0.99971	4.991663	0.994522	0.999811	1.797102	
Mean Value	1.492524							
Std Value	0.477174							

FINANCIAL REGULATION	FORMULA 1 REGULATION	UNIEVAL	NATURALNESS	COHERENCE	ENGAGINGNESS	GROUNDNESS	UNDERSTANDABILITY	OVERALL
	Tuple 1	0.999911	0.999794	0.999926	0.999914	0.999898	0.999889	
	Tuple 2	0.999859	0.999806	0.99991	0.999837	0.999866	0.999856	
	Tuple 3	0.999695	0.99975	1.999524	0.998675	0.999692	1.199467	
	Tuple 4	0.999786	0.999553	3.998335	0.999536	0.999827	1.599407	
	Tuple 5	0.999561	0.999668	3.997861	0.999706	0.99964	1.599287	
	Tuple 6	0.999781	0.999032	0.999792	0.999722	0.999765	0.999618	
	Tuple 7	0.999901	0.99958	1.998612	0.997154	0.999892	1.199028	
	Tuple 8	0.999538	0.999845	2.997952	0.999476	0.999546	1.399271	
	Tuple 9	0.999844	0.999685	1.998364	0.999642	0.999841	1.199475	
	Tuple 10	0.999678	0.999572	0.999799	0.999746	0.999639	0.999687	
Mean Value		1.219499						
Std Value		0.239269						

CONCLUSIONS AND POTENTIAL FUTURE DEVELOPMENTS

- 1 Development efficiency
- 2 Customization
- 3 Innovation
- 4 Correct and informative answers
- 5 Human-like dialogue

A

**SYSTEM for
TECHNICAL
ANALYSIS OF
RACES AND
QUALIFICATIONS**



- Telemetry
- Lap Times
- Car Position
- Tire Data
- Weather

B

**MULTILINGUAL
SYSTEM**



C

**TICKET
PURCHASE
SYSTEM for
Grand Prix**



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Link to the project:

<https://github.com/filippoflorindi/F-One>