

Data Mining

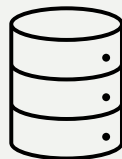
Final Presentation

Group 6:

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Champi

- Training Assistant.
- Chat that creates personalized training plans for beginners.



Data



PDF files - textual data is extracted for analysis and identification of **metadata**. The PDFs contain data about workout routines for beginners

```
metadata['days']  
metadata['week']  
metadata['exercises']  
metadata['body_parts']  
metadata['equipment']
```

Monday - Chest & Triceps

Exercise	Sets	Reps
Chest		
Dumbbell Bench Press	4	12, 10, 10, 10
Incline Bench Press	2	10
Triceps		
Tricep Dip	3	Failure
Lying Tricep Extension	3	10

Full Body Workout for Beginners

Exercise	Sets	Reps
Trap Bar Deadlift	3	3 - 5
Bent Over Row	3	5 - 8
Dumbbell Overhead Press	3	6 - 10
Lat Pull Down	3	6 - 10
Dumbbell Bicep Curl	2	10 - 12
Rope Pressdown	2	10 - 12
Plank	2	Failure*

*Time yourself and try to improve the duration of your plank.

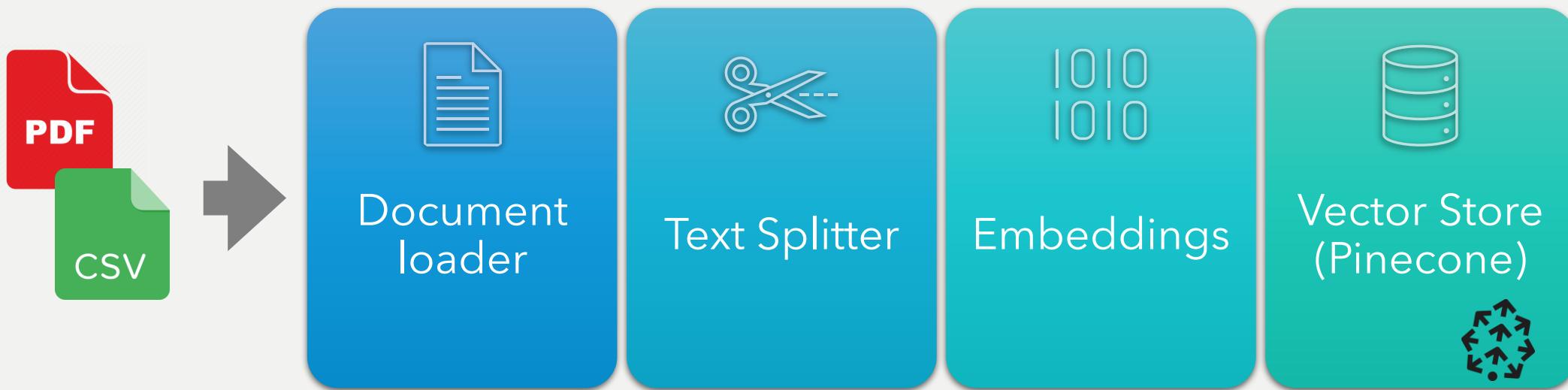
Data



Datasets - the datasets have information about workout exercises like exercise name, body part, type of the exercise (strength, cardio, stretch, etc.), equipment, etc.

exercise_name	type	bodypart	equipment	target
Bench barbell roll-out	Strength	Abdominals	Barbell	none
Barbell Side Bend	Strength	Abdominals	Barbell	none
Advanced Kettlebell Windmill	Strength	Abdominals	Kettlebells	none
Kettlebell Pass Between The Legs	Strength	Abdominals	Kettlebells	none
Dumbbell spell caster	Strength	Abdominals	Dumbbell	none

Storage and Indexing





Database

Pinecone (**vector database**) - service that facilitates efficient storage, retrieval, and management of high-dimensional vectors. It was used to required fast similarity searches, making it suitable for machine learning models that work with embeddings.

```
api_key = os.getenv('PINECONE_API_KEY')  
pc = Pinecone(api_key=api_key, pool_threads=30)
```

RAG (*Retrieval-Augmented Generation*)



Retriever



Prompt



Chat Model
(‘llama3’)



→ Similar vectors based
on similarity metrics

Model



llama3 from Ollama to generate embeddings using **OllamaEmbeddings** and **ChatOllama** classes.

```
from langchain_community.embeddings import OllamaEmbeddings
```

```
embeddings = OllamaEmbeddings(model="llama3")
```

```
llm = ChatOllama(model="llama3")
```




LangChain



Chat

Langchain Chat Model - Ollama

- **ChatOllama** - class from langchain_community package: Ollama bundles model weights, configuration, and data into a single package, defined by a Modelfile.
- **ChatPromptTemplate** - class from langchain_core package: facilitates structured conversations between users and AI systems.

```
def chatbot_first_message(vectorstore):
    question = input("\nEnter your message: ")
    if question.lower() == "exit":
        print("Exiting...")
        return None, None
    elif not question:
        question = "Give me a workout plan for beginners"

    docs = vectorstore.similarity_search(question, k=3)
    context = "\n".join([doc.page_content for doc in docs])

    llm = ChatOllama(model="llama3")

    template = """
    Answer the question based on the context below. If you can't
    answer the question, reply "I don't know". If the
    question has nothing to do with the context,
    answer the question normally.

    Context: {context}

    Question: {question}
    """

    prompt = ChatPromptTemplate.from_template(template)
    prompt.format(context=context, question=question)
    parser = StrOutputParser()
    chain = prompt | llm | parser
    response = str(chain.invoke({
        "context": context,
        "question": question
    })).strip()

    return question, response
```

Extraction

```
llm = ChatOllama(model="llama3")
```

```
prompt = ChatPromptTemplate.from_template(template)  
prompt.format(context=context, question=question)
```

```
parser = StrOutputParser()
```

```
chain = prompt | llm | parser
```

```
response = str(chain.invoke({  
    "context": context,  
    "question": question  
}).strip())
```



Information
Extraction



Prompt



Model
(llama3')



Output
parser



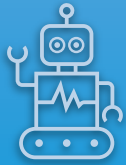
```
docs = vectorstore.similarity_search(question, k=3)  
context = "\n".join([doc.page_content for doc in docs])
```

chain

Structure Chat Agent

```
llm = ChatOllama(model="llama3")
tools = [TavilySearchResults(max_results=1)]
prompt = hub.pull("hwchase17/structured-chat-agent")
agent = create_structured_chat_agent(llm, tools, prompt)

agent_executor = AgentExecutor(
    agent=agent, tools=tools, verbose=True, handle_parsing_errors=True, max_attempts=1
)
```



Model



Tools



Prompt



Agent

Structure Chat Agent

Enter your message: what do i have to do on day 3?

> Entering new AgentExecutor chain...

Action:

```json

{

"action": "Final Answer",

"action\_input": "For Day 3, you need to focus on Lower Body and Core exercises. Here's your routine:

\* Warm-up: 5-minute light cardio

\* Strongman exercises:

+ Dumbbell deadlifts (3 sets of 8-12 reps)

+ Dumbbell calf raises (3 sets of 12-15 reps)

\* Powerlifting exercise:

+ Goblet Lunges (3 sets of 8-12 reps per leg)

\* Stretching: focus on lower body and core muscles

"

}

```\n

> Finished chain.

Chatbot



Hello! I am your AI Training Assistant.

Give me a workout routine for a 25 year old woman beginner in fitness

Based on the context, I'll provide a workout routine that incorporates exercises from various categories to help a 25-year-old woman beginner in fitness. Please note that before starting any new exercise program, it's essential to consult with a healthcare professional and get clearance.

Warm-up (5-10 minutes)

Cardio: Light jogging or jumping jacks to get the blood flowing and warm up the muscles

Stretching: Focus on stretching the major muscle groups like hamstrings, quadriceps, calves, and chest

Monday (Strongman):

1. Squats: 3 sets of 8-12 reps
2. Deadlifts: 3 sets of 8-12 reps
3. Bench Press: 3 sets of 8-12 reps
4. Pull-ups: 3 sets of as many reps as possible (or assisted pull-ups if needed)
5. Planks: 3 sets of 30-60 seconds

Wednesday (Plyometrics):

1. Box Jumps: 3 sets of 10-15 reps
2. Burpees: 3 sets of 10-15 reps
3. Mountain Climbers: 3 sets of 20-30 reps
4. Jump Squats: 3 sets of 10-15 reps

Friday (Olympic Weightlifting):

1. Clean and Jerk: 3 sets of 8-12 reps (start with lighter weights and focus on proper form)
2. Snatch: 3 sets of 8-12 reps
3. Press: 3 sets of 8-12 reps

Additional Tips:

- Start with lighter weights and gradually increase the load as you build strength and endurance.
- Focus on proper form and technique for each exercise, even if it means reducing the weight or number of reps.
- Make sure to warm up and stretch before each workout, and cool down afterwards to prevent injuries.
- Incorporate cardio exercises like jogging, cycling, or swimming for 20-30 minutes, 2-3 times a week, to improve overall fitness.
- Remember, consistency and patience are key. Stick to the routine and make adjustments as needed. Most importantly, listen to your body and take rest days when necessary.

Whats the exercises i need to do on wednesday?

Your workout routine for Wednesday is: Box Jumps (3 sets of 10-15 reps), Burpees (3 sets of 10-15 reps), Mountain Climbers (3 sets of 20-30 reps), and Jump Squats (3 sets of 10-15 reps). Make sure to warm up before starting and cool down afterwards.

Type a message



Ratings of Chat Prompt


Avaliação do Chat CHAMPI


Vão ser dados 4 exemplos de sets de treino diferentes para cada desafio, sendo que é necessário avaliar cada sete conforme as perguntas fornecidas.

* Obrigatório

Informações

Contactos

1. Your name * 

2. Diplomas/Estudos relacionados com desporto * 

[Seguinte](#)

Desafio 1 - Give me a workout plan for begginers focused on legs only

Resposta chat Champi:

Based on the given list of exercises, I can suggest a workout plan for beginners focusing on legs only. Here's a sample routine:

Warm-up (5-10 minutes) - Jumping jacks or light cardio to get your heart rate up and loosen your muscles

Leg Day

1. *Squats*: 3 sets of 8-12 reps

* Stand with feet shoulder-width apart, then bend knees and lower body until thighs are parallel to the ground. Push back up to the starting position.

2. *Lunges*: 3 sets of 8-12 reps (per leg)

* Stand with feet together, take a large step forward with one foot, and lower body until back knee almost touches the ground. Push back up to the starting position. Alternate legs.

3. *Leg Press*: 3 sets of 10-15 reps

* Sit on a leg press machine with your feet shoulder-width apart on the platform. Push the platform away from you, extending your legs.

4. *Calf Raises*: 3 sets of 12-15 reps

* Stand on a step or calf raise platform, then raise up onto your toes and lower back down.

3. Compreensão da mensagem do utilizador

* 




4. Clareza na resposta *



5. Precisão da resposta *



6. Relevância da resposta

* 



Ratings of Chat Prompts

- Gabriela Noivo (Degree in Sports)
- Ana Margarida (Masters in sports business)
- Ines Campelo (Degree in Sports)
- Pedro Maio (Personal Trainer)
- João Rodrigues (Personal Trainer)
- Luís Pinto (Personal Trainer)
- António Costa (Personal Trainer)

Ratings of Chat Prompts

Desafio 1 - Give me a workout plan for begginers focused on legs only

Desafio 2 - give me a 7 day workout routine for a young woman

Desafio 3 - give me a 7 day workout for a begginer focused on chest and upper muscles

Desafio 4- give me a 5 day workout for a 30 year old woman beginner in fitness

| | Compreensão da mensagem do
utilizador | Clareza na
resposta | Precisão da
resposta | Relevância da
resposta |
|-----------|--|------------------------|-------------------------|---------------------------|
| Desafio 1 | 4.14 | 4.57 | 3.57 | 3.43 |
| Desafio 2 | 4.14 | 4.14 | 3.86 | 3.71 |
| Desafio 3 | 4.43 | 4.43 | 3.86 | 3.86 |
| Desafio 4 | 4.00 | 4.00 | 3.29 | 3.00 |

Possible future improvements

- Cover different users' fitness levels, gender, ages and preferences
- Consider user injuries and struggles (weak muscles, broken bones, etc.)
- Collect more detailed data from users (height, weight, etc.)

References

1. www.langchain.com. (n.d.). LangChain. [online] Available at: <https://www.langchain.com/>
2. python.langchain.com. (n.d.). Introduction | 🐦 🔗 LangChain. [online] Available at: https://python.langchain.com/v0.1/docs/get_started/introduction
3. python.langchain.com. (n.d.). Structured chat | 🐦 🔗 LangChain. [online] Available at: https://python.langchain.com/v0.1/docs/modules/agents/agent_types/structured_chat
4. Jack (2024). pixegami/rag-tutorial-v2. [online] GitHub. Available at: <https://github.com/pixegami/rag-tutorial-v2/tree/main>
5. Valdarrama, S. (2024). svpino/youtube-rag. [online] GitHub. Available at: <https://github.com/svpino/youtube-rag>