

# Applying AI with Python

Alex Conway  
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## Alex Conway

Founder NumberBoost, AiSupervision (YC W22)

Cape Town, Western Cape, South Africa · [Contact info](#)



NumberBoost



Y Combinator

[x.com/alexconway](http://x.com/alexconway)  
[linkedin.com/in/alexconway/](https://linkedin.com/in/alexconway/)





## Quantitative Analyst & Data Engineer

Mergence Investment Managers

Jul 2013 - Dec 2015 · 2 yrs 6 mos



## Data Scientist

Superbalist.com

Feb 2016 - Jan 2017 · 1 yr



## Founder, CEO

NumberBoost

Jun 2016 - Present · 8 yrs 4 mos

We are multi-award winning AI developers.

- \* Won Mercedes-Benz Innovation Competition
- \* Won NTT Japan Open Innovation Challenge ZA
- \* Won Lloyd's Register London A.I. Real-time Error Detection Challenge
- \* Won MultiChoice Innovation Competition
- \* Won Best on-chain AI agent(s) built on Galadriel
- \* Won Best Use of CoopHive for AI Applications



## Co-founder, CTO

AiSupervision (YC W22)

Sep 2020 - May 2023 · 2 yrs 9 mos

The operating system for factory production lines.



## Y Combinator

W22



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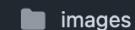
23 Commits



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README.md

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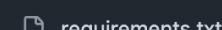
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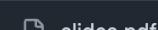
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requirements.txt

add text scraping

yesterday



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README



# Applying AI with Python



Slides and code for ["Applying AI with Python"](#) talk at PyConZA 2024.

This code introduces a novel agent architecture that demonstrates self-reflection, tool use and reasoning.

## About



Slides and Code for my talk at PyConZA 2024 on "Applying AI with Python"

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[github.com/alexchnwy/applying-ai-with-python](https://github.com/alexchnwy/applying-ai-with-python)



# What is Artificial Intelligence (AI)?





## what is artificial intelligence



Artificial Intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to perform tasks that typically require human intelligence. At the core of AI are models that take input data, apply transformations to it using learned patterns or algorithms, and produce a desired output.





## what is artificial intelligence



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def ai_model(input):  
    #  
    # algorithms f(input) = output  
    #  
    return output
```



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|    | A                | B   | C        | D      |
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# Input



## Image / Video



## Audio



```
def ai_model(input):  
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```



# Algorithm Terminology

- **(Supervised) Regression** (predict a number)
- **(Supervised) Classification** (predict a category / label)
- **Unsupervised** (find patterns within a dataset without labels)
- **Generative** (create new data / content)



# Types of AI Algorithms

- **Regression** (Linear / Polynomial / Logistic, etc.)
- **Decision Trees** (Random Forests, GBMs, etc.)
- **Clustering** (K-Means, Spectral, DBSCAN, etc.)
- **Neural Networks** (Convolutional, Recurrent, Transformer, etc.)
- And more...



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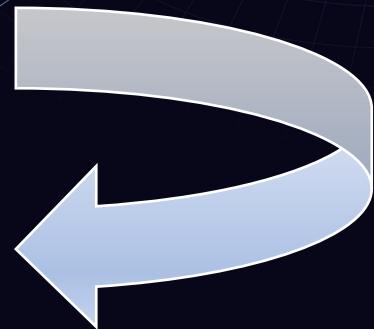
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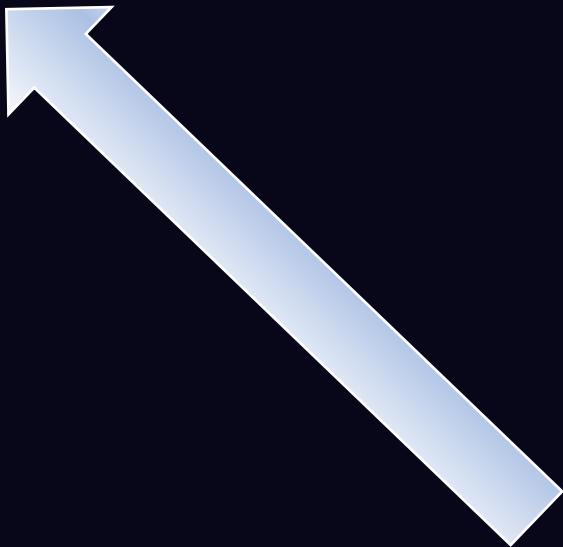
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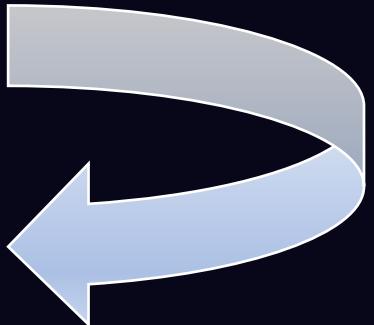


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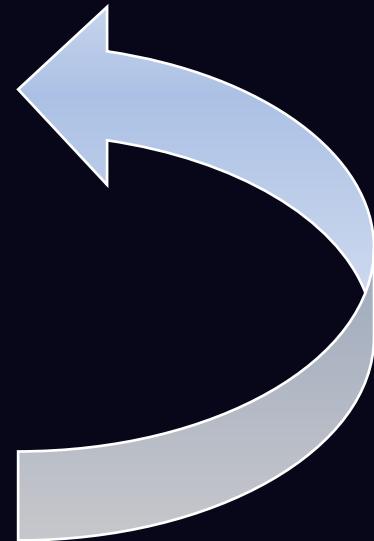
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# Why Python for AI?

- Easy to use (ML researchers often != software engineers)
- Massive community (easy to find answers to questions)
- Extensive libraries and frameworks (don't need to invent to use)

 TensorFlow



 PyTorch



 Keras

Hugging Face



 XGBoost

 statsmodels

 pandas





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 Text Generation • Updated 6 days ago • ↓ 22.6k • ⚡ • 135

 [OnomaAIResearch/Illustrious-xl-early-release-v0](#)  
 Text-to-Image • Updated 2 days ago • ↓ 3.56k • ⚡ • 160

 [amd/AMD-Llama-135m](#)  
 Text Generation • Updated Aug 6 • ↓ 2.77k • 89

 [allenai/Molmo-7B-0-0924](#)  
 Image-Text-to-Text • Updated 1 day ago • ↓ 1.96k • 112

 [meta-llama/Llama-3.1-8B-Instruct](#)  
 Text Generation • Updated 8 days ago • ↓ 3.23M • ⚡ • 2.69k

 [nvidia/Llama-3\\_1-Nemotron-51B-Instruct](#)  
 Text Generation • Updated 3 days ago • ↓ 13.6k • 164

 [openai/whisper-large-v3](#)  
 Automatic Speech Recognition • Updated Aug 12 • ↓ 4.14M • ⚡ • 3.5k

 [AIDC-AI/Ovis1.6-Gemma2-9B](#)  
 Image-Text-to-Text • Updated 7 days ago • ↓ 6.58k • 184

# Table Data





# Wine Quality

Donated on 10/6/2009

Two datasets are included, related to red and white vinho verde wine samples, from the north of Portugal. The goal is to model wine quality based on physicochemical tests (see [Cortez et al., 2009], <http://www3.dsi.uminho.pt/pcortez/wine/>).

## Dataset Characteristics

Multivariate

## Subject Area

Business

## Associated Tasks

Classification, Regression

## Feature Type

Real

## # Instances

4898

## # Features

11

<https://archive.ics.uci.edu/dataset/186/wine+quality>



|    | A             | B                | C           | D              | E         | F                   | G                    | H       | I    | J         | K       | L     | M       |
|----|---------------|------------------|-------------|----------------|-----------|---------------------|----------------------|---------|------|-----------|---------|-------|---------|
| 1  | fixed acidity | volatile acidity | citric acid | residual sugar | chlorides | free sulfur dioxide | total sulfur dioxide | density | pH   | sulphates | alcohol | color | quality |
| 2  | 7.4           | 0.7              | 0           | 1.9            | 0.076     | 11                  | 34                   | 0.9978  | 3.51 | 0.56      | 9.4     | 0     | 5       |
| 3  | 7.8           | 0.88             | 0           | 2.6            | 0.098     | 25                  | 67                   | 0.9968  | 3.2  | 0.68      | 9.8     | 0     | 5       |
| 4  | 7.8           | 0.76             | 0.04        | 2.3            | 0.092     | 15                  | 54                   | 0.997   | 3.26 | 0.65      | 9.8     | 0     | 5       |
| 5  | 11.2          | 0.28             | 0.56        | 1.9            | 0.075     | 17                  | 60                   | 0.998   | 3.16 | 0.58      | 9.8     | 0     | 6       |
| 6  | 7.4           | 0.7              | 0           | 1.9            | 0.076     | 11                  | 34                   | 0.9978  | 3.51 | 0.56      | 9.4     | 0     | 5       |
| 7  | 7.4           | 0.66             | 0           | 1.8            | 0.075     | 13                  | 40                   | 0.9978  | 3.51 | 0.56      | 9.4     | 0     | 5       |
| 8  | 7.9           | 0.6              | 0.06        | 1.6            | 0.069     | 15                  | 59                   | 0.9964  | 3.3  | 0.46      | 9.4     | 0     | 5       |
| 9  | 7.3           | 0.65             | 0           | 1.2            | 0.065     | 15                  | 21                   | 0.9946  | 3.39 | 0.47      | 10      | 0     | 7       |
| 10 | 7.8           | 0.58             | 0.02        | 2              | 0.073     | 9                   | 18                   | 0.9968  | 3.36 | 0.57      | 9.5     | 0     | 7       |
| 11 | 7.5           | 0.5              | 0.36        | 6.1            | 0.071     | 17                  | 102                  | 0.9978  | 3.35 | 0.8       | 10.5    | 0     | 5       |
| 12 | 6.7           | 0.58             | 0.08        | 1.8            | 0.097     | 15                  | 65                   | 0.9959  | 3.28 | 0.54      | 9.2     | 0     | 5       |
| 13 | 7.5           | 0.5              | 0.36        | 6.1            | 0.071     | 17                  | 102                  | 0.9978  | 3.35 | 0.8       | 10.5    | 0     | 5       |
| 14 | 5.6           | 0.615            | 0           | 1.6            | 0.089     | 16                  | 59                   | 0.9943  | 3.58 | 0.52      | 9.9     | 0     | 5       |
| 15 | 7.8           | 0.61             | 0.29        | 1.6            | 0.114     | 9                   | 29                   | 0.9974  | 3.26 | 1.56      | 9.1     | 0     | 5       |
| 16 | 8.9           | 0.62             | 0.18        | 3.8            | 0.176     | 52                  | 145                  | 0.9986  | 3.16 | 0.88      | 9.2     | 0     | 5       |
| 17 | 8.9           | 0.62             | 0.19        | 3.9            | 0.17      | 51                  | 148                  | 0.9986  | 3.17 | 0.93      | 9.2     | 0     | 5       |
| 18 | 8.5           | 0.28             | 0.56        | 1.8            | 0.092     | 35                  | 103                  | 0.9969  | 3.3  | 0.75      | 10.5    | 0     | 7       |
| 19 | 8.1           | 0.56             | 0.28        | 1.7            | 0.368     | 16                  | 56                   | 0.9968  | 3.11 | 1.28      | 9.3     | 0     | 5       |
| 20 | 7.4           | 0.59             | 0.08        | 4.4            | 0.086     | 6                   | 29                   | 0.9974  | 3.38 | 0.5       | 9       | 0     | 4       |
| 21 | 7.9           | 0.32             | 0.51        | 1.8            | 0.341     | 17                  | 56                   | 0.9969  | 3.04 | 1.08      | 9.2     | 0     | 6       |
| 22 | 8.9           | 0.22             | 0.48        | 1.8            | 0.077     | 29                  | 60                   | 0.9968  | 3.39 | 0.53      | 9.4     | 0     | 6       |
| 23 | 7.6           | 0.39             | 0.31        | 2.3            | 0.082     | 23                  | 71                   | 0.9982  | 3.52 | 0.65      | 9.7     | 0     | 5       |
| 24 | 7.9           | 0.43             | 0.21        | 1.6            | 0.106     | 10                  | 37                   | 0.9966  | 3.17 | 0.91      | 9.5     | 0     | 5       |
| 25 | 8.5           | 0.49             | 0.11        | 2.3            | 0.084     | 9                   | 67                   | 0.9968  | 3.17 | 0.53      | 9.4     | 0     | 5       |
| 26 | 6.9           | 0.4              | 0.14        | 2.4            | 0.085     | 21                  | 40                   | 0.9968  | 3.43 | 0.63      | 9.7     | 0     | 6       |

# Regression Model to Predict Wine Quality



# Jupyter Notebook

TableData.ipynb



|    | A             | B                | C           | D              | E         | F                   | G                    | H       | I    | J         | K       | L     | M       |
|----|---------------|------------------|-------------|----------------|-----------|---------------------|----------------------|---------|------|-----------|---------|-------|---------|
| 1  | fixed acidity | volatile acidity | citric acid | residual sugar | chlorides | free sulfur dioxide | total sulfur dioxide | density | pH   | sulphates | alcohol | color | quality |
| 2  | 7.4           | 0.7              | 0           | 1.9            | 0.076     | 11                  | 34                   | 0.9978  | 3.51 | 0.56      | 9.4     | red   | 5       |
| 3  | 7.8           | 0.88             | 0           | 2.6            | 0.098     | 25                  | 67                   | 0.9968  | 3.2  | 0.68      | 9.8     | red   | 5       |
| 4  | 7.8           | 0.76             | 0.04        | 2.3            | 0.092     | 15                  | 54                   | 0.997   | 3.26 | 0.65      | 9.8     | red   | 5       |
| 5  | 11.2          | 0.28             | 0.56        | 1.9            | 0.075     | 17                  | 60                   | 0.998   | 3.16 | 0.58      | 9.8     | red   | 6       |
| 6  | 7.4           | 0.7              | 0           | 1.9            | 0.076     | 11                  | 34                   | 0.9978  | 3.51 | 0.56      | 9.4     | red   | 5       |
| 7  | 7.4           | 0.66             | 0           | 1.8            | 0.075     | 13                  | 40                   | 0.9978  | 3.51 | 0.56      | 9.4     | red   | 5       |
| 8  | 7.9           | 0.6              | 0.06        | 1.6            | 0.069     | 15                  | 59                   | 0.9964  | 3.3  | 0.46      | 9.4     | red   | 5       |
| 9  | 7.3           | 0.65             | 0           | 1.2            | 0.065     | 15                  | 21                   | 0.9946  | 3.39 | 0.47      | 10      | red   | 7       |
| 10 | 7.8           | 0.58             | 0.02        | 2              | 0.073     | 9                   | 18                   | 0.9968  | 3.36 | 0.57      | 9.5     | red   | 7       |
| 11 | 7.5           | 0.5              | 0.36        | 6.1            | 0.071     | 17                  | 102                  | 0.9978  | 3.35 | 0.8       | 10.5    | red   | 5       |
| 12 | 6.7           | 0.58             | 0.08        | 1.8            | 0.097     | 15                  | 65                   | 0.9959  | 3.28 | 0.54      | 9.2     | red   | 5       |
| 13 | 7.5           | 0.5              | 0.36        | 6.1            | 0.071     | 17                  | 102                  | 0.9978  | 3.35 | 0.8       | 10.5    | red   | 5       |
| 14 | 5.6           | 0.615            | 0           | 1.6            | 0.089     | 16                  | 59                   | 0.9943  | 3.58 | 0.52      | 9.9     | red   | 5       |
| 15 | 7.8           | 0.61             | 0.29        | 1.6            | 0.114     | 9                   | 29                   | 0.9974  | 3.26 | 1.56      | 9.1     | red   | 5       |
| 16 | 8.9           | 0.62             | 0.18        | 3.8            | 0.176     | 52                  | 145                  | 0.9986  | 3.16 | 0.88      | 9.2     | red   | 5       |
| 17 | 8.9           | 0.62             | 0.19        | 3.9            | 0.17      | 51                  | 148                  | 0.9986  | 3.17 | 0.93      | 9.2     | red   | 5       |
| 18 | 8.5           | 0.28             | 0.56        | 1.8            | 0.092     | 35                  | 103                  | 0.9969  | 3.3  | 0.75      | 10.5    | red   | 7       |
| 19 | 8.1           | 0.56             | 0.28        | 1.7            | 0.368     | 16                  | 56                   | 0.9968  | 3.11 | 1.28      | 9.3     | red   | 5       |
| 20 | 7.4           | 0.59             | 0.08        | 4.4            | 0.086     | 6                   | 29                   | 0.9974  | 3.38 | 0.5       | 9       | red   | 4       |
| 21 | 7.9           | 0.32             | 0.51        | 1.8            | 0.341     | 17                  | 56                   | 0.9969  | 3.04 | 1.08      | 9.2     | red   | 6       |
| 22 | 8.9           | 0.22             | 0.48        | 1.8            | 0.077     | 29                  | 60                   | 0.9968  | 3.39 | 0.53      | 9.4     | red   | 6       |
| 23 | 7.6           | 0.39             | 0.31        | 2.3            | 0.082     | 23                  | 71                   | 0.9982  | 3.52 | 0.65      | 9.7     | red   | 5       |
| 24 | 7.9           | 0.43             | 0.21        | 1.6            | 0.106     | 10                  | 37                   | 0.9966  | 3.17 | 0.91      | 9.5     | red   | 5       |
| 25 | 8.5           | 0.49             | 0.11        | 2.3            | 0.084     | 9                   | 67                   | 0.9968  | 3.17 | 0.53      | 9.4     | red   | 5       |
| 26 | 6.9           | 0.4              | 0.14        | 2.4            | 0.085     | 21                  | 40                   | 0.9968  | 3.43 | 0.63      | 9.7     | red   | 6       |

# Classification Model to Predict Wine Colour



# Jupyter Notebook

TableData.ipynb



|    | A       | B         | C              | D       |
|----|---------|-----------|----------------|---------|
| 1  | Recency | Frequency | Monetary Value | Churned |
| 2  | 13      | 3         | 983            | 0       |
| 3  | 62      | 7         | 1090           | 0       |
| 4  | 29      | 3         | 292            | 0       |
| 5  | 10      | 5         | 226            | 1       |
| 6  | 176     | 7         | 802            | 1       |
| 7  | 48      | 5         | 252            | 0       |
| 8  | 137     | 9         | 1825           | 1       |
| 9  | 177     | 3         | 1888           | 0       |
| 10 | 64      | 9         | 985            | 1       |
| 11 | 175     | 5         | 182            | 0       |
| 12 | 47      | 7         | 1545           | 1       |
| 13 | 110     | 9         | 378            | 1       |
| 14 | 178     | 10        | 1632           | 0       |
| 15 | 125     | 4         | 1824           | 1       |





# Hugging Face

Tabular



Tabular Classification



Tabular Regression



Time Series Forecasting





aws amazon/chronos-t5-tiny

like 86

Time Series Forecasting Transformers Safetensors t5 text2text-generation time series forecasting pretrained models foundation models time series foundation models time-series  
text-generation-inference Inference Endpoints arxiv:2403.07815 arxiv:1910.10683 License: apache-2.0

Model card

Files and versions

Community 4

⋮

Train

Deploy

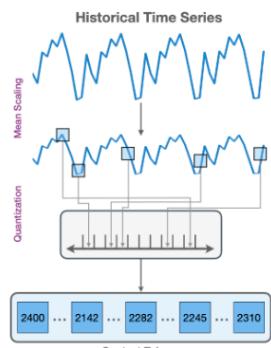
Use this model

## Chronos-T5 (Tiny)

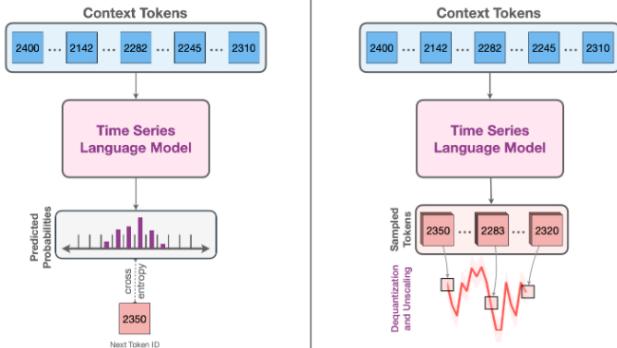
Chronos is a family of **pretrained time series forecasting models** based on language model architectures. A time series is transformed into a sequence of tokens via scaling and quantization, and a language model is trained on these tokens using the cross-entropy loss. Once trained, probabilistic forecasts are obtained by sampling multiple future trajectories given the historical context. Chronos models have been trained on a large corpus of publicly available time series data, as well as synthetic data generated using Gaussian processes.

For details on Chronos models, training data and procedures, and experimental results, please refer to the paper [Chronos: Learning the Language of Time Series](#).

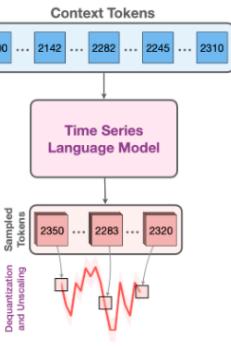
### Time Series Tokenization



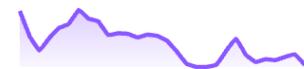
### Training



### Inference



Downloads last month  
**14,029,406**



Safetensors

Model size 8.39M params Tensor type F32

### Inference API

Time Series Forecasting

Inference API (serverless) does not yet support transformers models for this pipeline type.

### Collection including amazon/chronos-t5-tiny

#### Chronos Models & Datasets

Chronos: Pretrained (language) models fo... • 8 items • Updated Jun 27 • △ 28



aws amazon/chronos-t5-tiny

Time Series Forecasting Transformers  
text-generation-inference Inference Endpoints

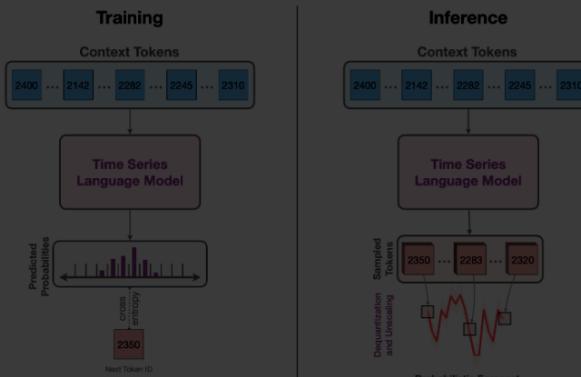
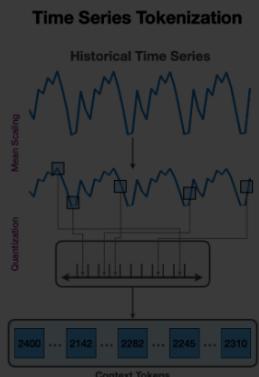
Model card Files and versions

## Chronos-T5 (Tiny)

Chronos is a family of pretrained time series architectures. A time series is transformed into tokens, and a language model is trained on these tokens. Probabilistic forecasts are obtained by sampling from the language model.

Chronos models have been trained on a large corpus of publicly available time series data, as well as synthetic data generated using Gaussian processes.

For details on Chronos models, training data and procedures, and experimental results, please refer to the paper [Chronos: Learning the Language of Time Series](#).

How to use from the **Transformers** library

```
# Load model directly
from transformers import AutoTokenizer, AutoModelForSeq2SeqLM

tokenizer = AutoTokenizer.from_pretrained("amazon/chronos-t5-tiny")
model = AutoModelForSeq2SeqLM.from_pretrained("amazon/chronos-t5-tiny")
```

### Quick Links

- [Read model documentation](#)
- [Read docs on high-level-pipeline](#)
- [Read our learning resources](#)

Models time-series

Train Deploy Use this model

Model size 8.39M params Tensor type F32



Time Series Forecasting

Inference API (serverless) does not yet support transformers models for this pipeline type.

Collection including amazon/chronos-t5-tiny

### Chronos Models & Datasets

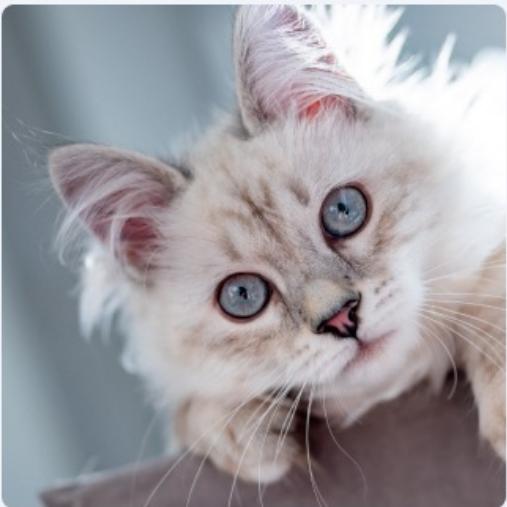
Chronos: Pretrained (language) models for... 8 items Updated Jun 27 △ 28



# Image / Video Data



## Classification

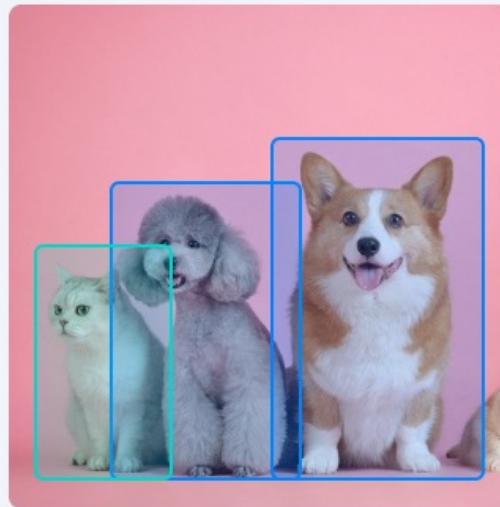


Cat



Single Object

## Detection



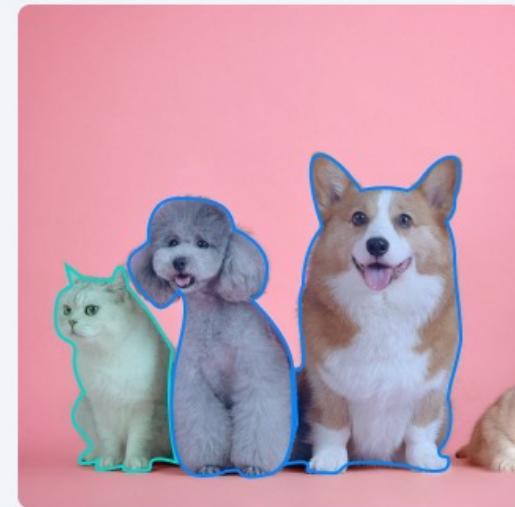
Cat

Dog



Multiple Objects

## Segmentation



Cat

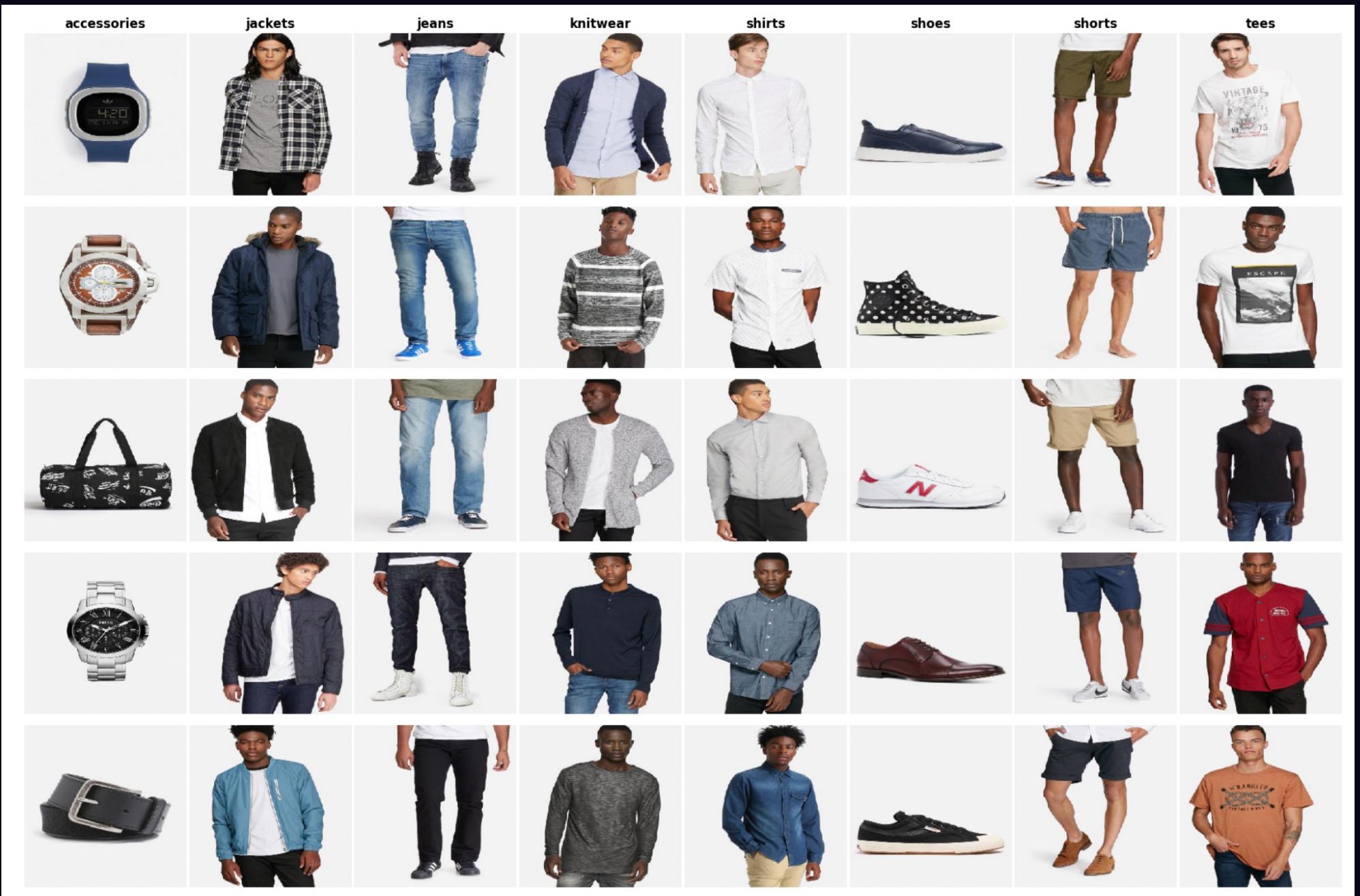
Dog



# Jupyter Notebook

Classification and Visual Search.ipynb





```
Epoch 1/10
109/109 0s 641ms/step - accuracy: 0.7584 - loss: 0.7600
Epoch 1: val_accuracy improved from -inf to 0.95026, saving model to best_model.keras
109/109 80s 717ms/step - accuracy: 0.7595 - loss: 0.7567 - val_accuracy: 0.9503 - val_loss: 0.1754
Epoch 2/10
109/109 0s 637ms/step - accuracy: 0.9577 - loss: 0.1332
Epoch 2: val_accuracy did not improve from 0.95026
109/109 78s 712ms/step - accuracy: 0.9576 - loss: 0.1332 - val_accuracy: 0.9503 - val_loss: 0.1359
Epoch 3/10
109/109 0s 721ms/step - accuracy: 0.9698 - loss: 0.0950
Epoch 3: val_accuracy improved from 0.95026 to 0.95288, saving model to best_model.keras
109/109 88s 810ms/step - accuracy: 0.9698 - loss: 0.0950 - val_accuracy: 0.9529 - val_loss: 0.1358
Epoch 4/10
109/109 0s 1s/step - accuracy: 0.9770 - loss: 0.0754
Epoch 4: val_accuracy did not improve from 0.95288
109/109 126s 1s/step - accuracy: 0.9770 - loss: 0.0754 - val_accuracy: 0.9450 - val_loss: 0.1363
Epoch 5/10
109/109 0s 753ms/step - accuracy: 0.9839 - loss: 0.0519
Epoch 5: val_accuracy did not improve from 0.95288
109/109 91s 833ms/step - accuracy: 0.9839 - loss: 0.0520 - val_accuracy: 0.9503 - val_loss: 0.1437
Epoch 6/10
109/109 0s 675ms/step - accuracy: 0.9854 - loss: 0.0472
Epoch 6: val_accuracy did not improve from 0.95288
109/109 81s 745ms/step - accuracy: 0.9854 - loss: 0.0472 - val_accuracy: 0.9450 - val_loss: 0.1460
Epoch 7/10
109/109 0s 663ms/step - accuracy: 0.9893 - loss: 0.0400
Epoch 7: val_accuracy improved from 0.95288 to 0.96073, saving model to best_model.keras
109/109 81s 739ms/step - accuracy: 0.9893 - loss: 0.0400 - val_accuracy: 0.9607 - val_loss: 0.1406
Epoch 8/10
109/109 0s 654ms/step - accuracy: 0.9887 - loss: 0.0438
Epoch 8: val_accuracy did not improve from 0.96073
109/109 79s 728ms/step - accuracy: 0.9887 - loss: 0.0438 - val_accuracy: 0.9555 - val_loss: 0.1354
Epoch 9/10
109/109 0s 674ms/step - accuracy: 0.9939 - loss: 0.0263
Epoch 9: val_accuracy did not improve from 0.96073
109/109 82s 753ms/step - accuracy: 0.9940 - loss: 0.0263 - val_accuracy: 0.9503 - val_loss: 0.1398
Epoch 10/10
109/109 0s 659ms/step - accuracy: 0.9965 - loss: 0.0214
Epoch 10: val_accuracy did not improve from 0.96073
109/109 80s 734ms/step - accuracy: 0.9965 - loss: 0.0214 - val_accuracy: 0.9503 - val_loss: 0.1457
```

```
: # Evaluate on validation set
loss, accuracy = model.evaluate(valid_dataset)
print(f'Test Accuracy: {accuracy*100:.2f}%')
```

```
12/12 8s 650ms/step - accuracy: 0.9492 - loss: 0.1535
Test Accuracy: 96.07%
```



# Embeddings

$f($



$) = [0.14, 1.52, \dots]$

Input Image



Top 10 Similar Images

Rank 1



Rank 2



Rank 3



Rank 4



Rank 5



Rank 6



Rank 7



Rank 8



Rank 9



Rank 10



# Jupyter Notebook

Object Detection.ipynb



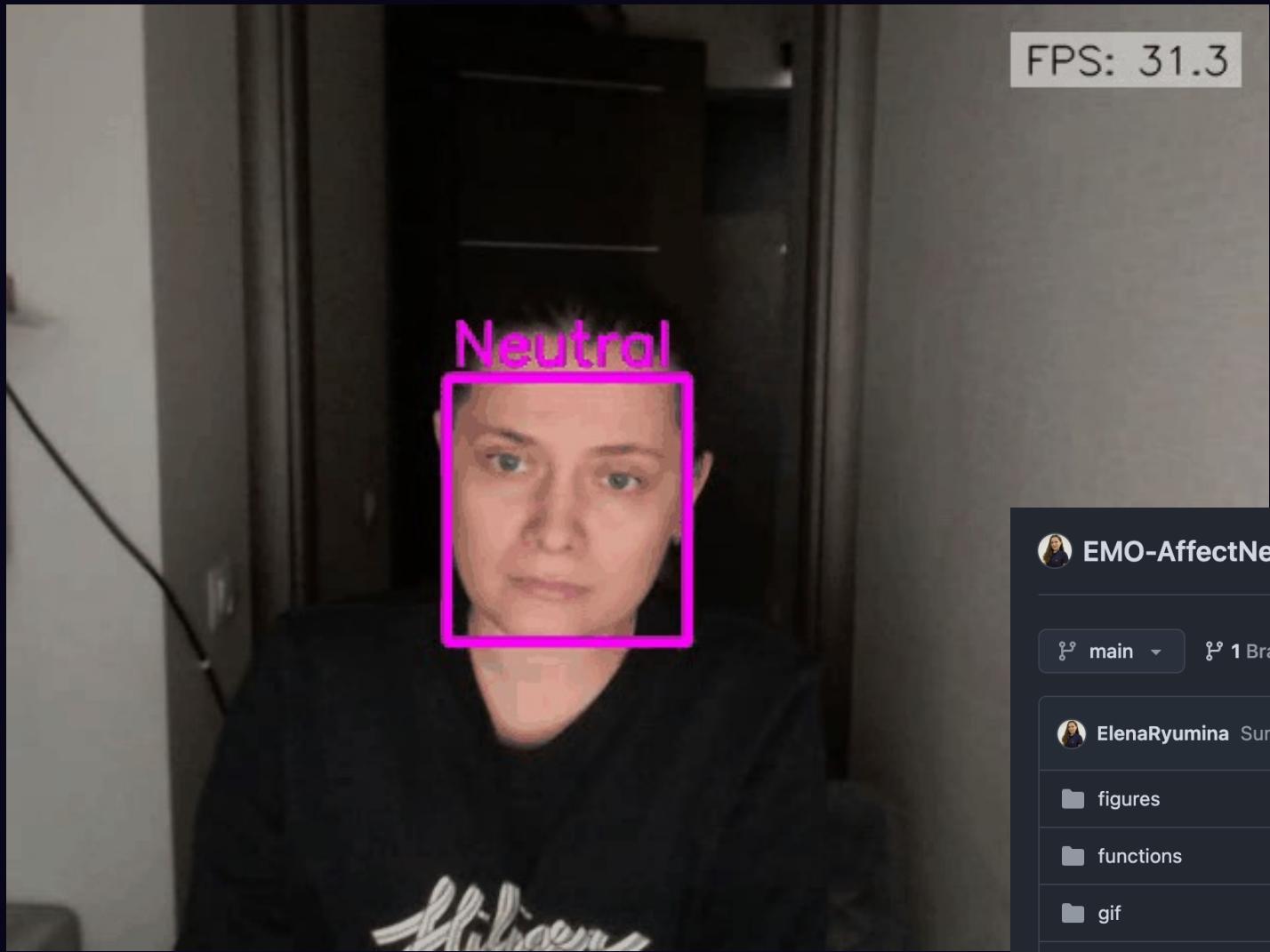
Original Image



Detected 14 persons  
Detected 4 cars

YOLOv8 Object Detection





 **EMO-AffectNetModel** Public

 main   1 Branch  0 Tags  Go to file 

|  ElenaRyumina                            | Summary                            | 3dc8ed2 · |
|---|------------------------------------|-----------|
|  figures                                 | Update results_emo_pred_videos.PNG |           |
|  functions                              | Summary                            |           |
|  gif                                   | Update                             |           |
|  LICENSE                               | Initial commit                     |           |
|  README.md                             | Update README.md                   |           |
|  check_backbone_models_by_webcam.ipynb | Update                             |           |

<https://github.com/ElenaRyumina/EMO-AffectNetModel>



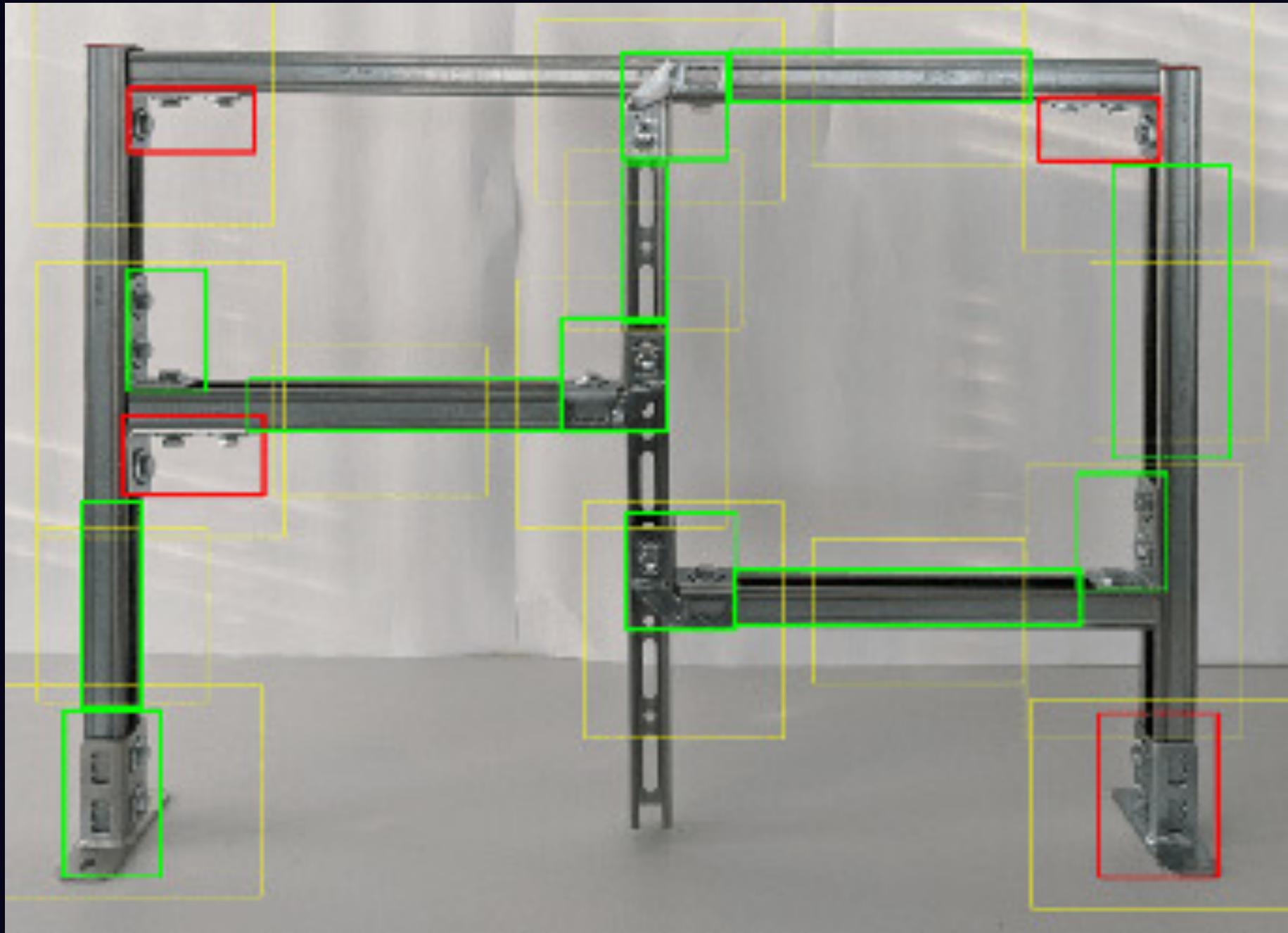
13:56:12

1



O





# Jupyter Notebook

Segmentation.ipynb



Original Image



6541 pixels of type car  
14417 pixels of type person

Segmentation Overlay



Original Image



Original Image with 50% Transparent Segmentation Mask



Car with Drop Shadow on New Background





# Qwen2-VL-Max

This WebUI is based on Qwen2-VL-Max, developed by Alibaba Cloud.

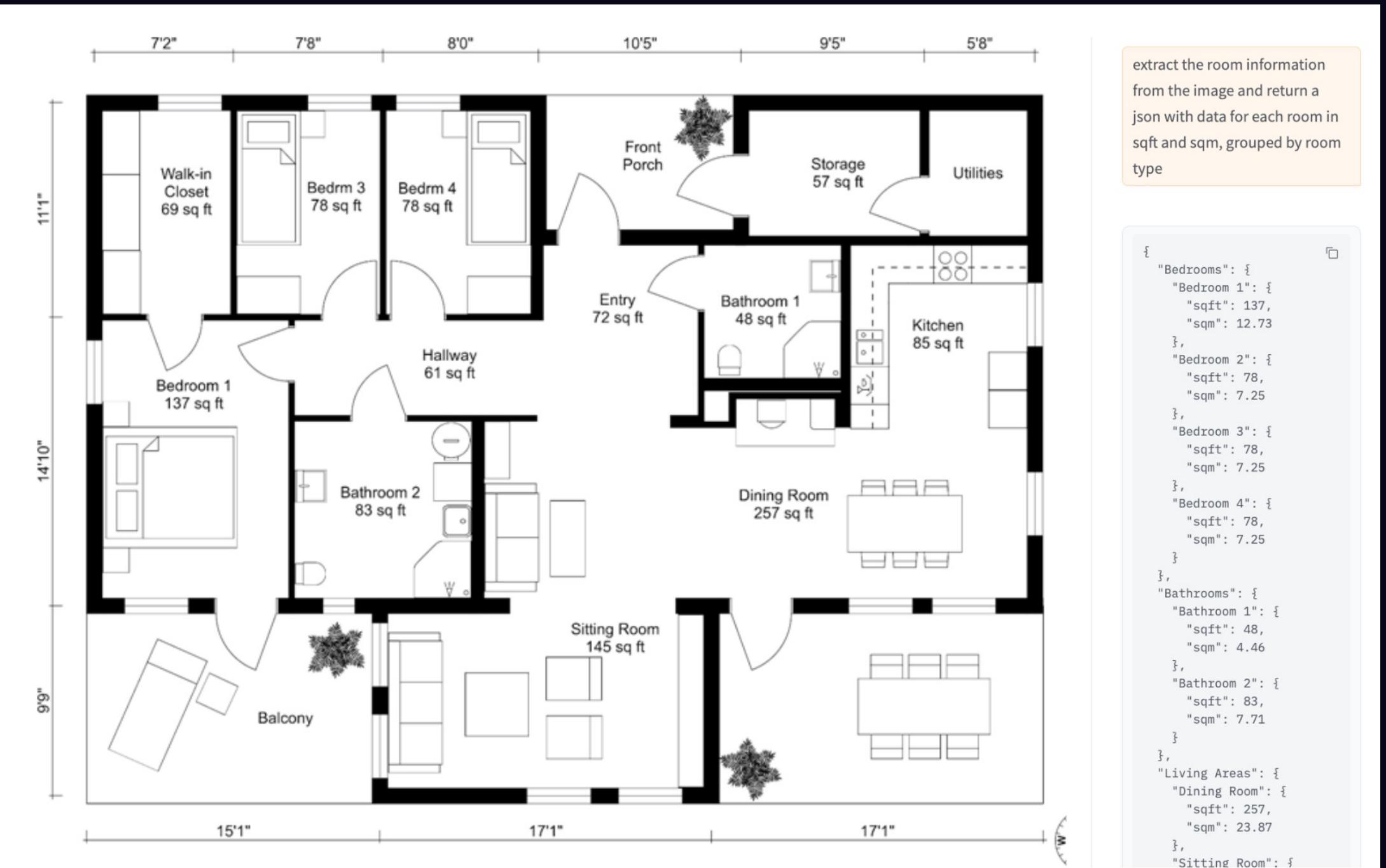
本WebUI基于Qwen2-VL-Max。

Qwen2-VL-Max

return a JSON object with all the data from the passport

```
{
  "passport": {
    "type": "P",
    "code": "VNM",
    "number": "B9575757",
    "holder": {
      "full_name": "PHAM KIEU M SURAPAPAN",
      "nationality": "VIET NAM / VIETNAMESE",
      "date_of_birth": "22/02/1976",
      "sex": "F",
      "place_of_birth": "TAM BI"
    },
    "issue": {
      "date": "28/12/2008",
      "place": "Cục Quản lý xuất nhập cảnh"
    },
    "expiry": "28/12/2018",
    "id_card_number": "B9575757"
  }
}
```







**Directions:** For adults, take two (2) vegan capsules daily, preferably with a meal. Do not exceed stated dose.

#### Nutrition Information

##### Typically Per Daily Dose

Psyllium Husk Powder 1400mg

**Ingredients:** Psyllium Husk Powder, Capsule Shell (Hydroxypropylmethylcellulose), Anti-Caking Agents (Magnesium Salts of Fatty Acids, Silicon Dioxide).

**May contain Sesame Seeds & Mustard.** For allergens, see the ingredients in bold.

**Notice:** Take this product with 220ml of fluids. Taking this product without adequate fluid may cause the possibility of choking. Do not use this product if you have difficulty swallowing. If you experience chest pain, vomiting or difficulty in swallowing or breathing after taking this product, seek immediate medical attention. Do not take before sleeping. Fibre products can affect the absorption of many medications. Do not take this product within 1.5 hours of taking medication.

**Free From:** Artificial Colour, Artificial Flavour, Artificial Sweetener, Preservatives.

SUITABLE FOR VEGETARIANS & VEGANS

HU16790 C

Horbäach®

return a JSON object with all the data about the product in this image including its name and manufacturer

```
{  
  "name": "Psyllium Husk",  
  "manufacturer": "Horbaach",  
  "strength": "1400mg",  
  "type": "Plantago Ovata Plant Seeds",  
  "quantity": "365 Vegan Capsules",  
  "directions": "For adults, take two (2) vegan capsules daily, preferably with a meal.",  
  "nutrition_information": {  
    "per_daily_dose": {  
      "psyllium_husk_powder": "1400mg"  
    },  
    "ingredients": [  
      "Psyllium Husk Powder",  
      "Capsule Shell (Hydroxypropylmethylcellulose)",  
      "Anti-Caking Agents (Magnesium Salts of Fatty Acids, Silicon Dioxide)"  
    ],  
    "allergen_information": "May contain Sesame Seeds & Mustard. For allergens, see the ingredients in bold.",  
    "notice": "Take this product with 220ml of fluids. Taking this product without adequate fluid may cause the possibility of choking.",  
    "free_from": [  
      "Artificial Colour",  
      "Artificial Flavour",  
      "Artificial Sweetener",  
      "Preservatives"  
    ],  
    "suitable_for": [  
      "Vegetarians",  
      "Vegans"  
    ]  
  }  
}
```

Here's an example of my normal handwriting. Notice how letters are connected in a way that has little to do with word length - as in "normal" - 1, 2, 3 letters are grouped.

write out all the text in this handwritten note. be careful not to make any mistakes.

Here's an example of my normal handwriting. Notice how letters are connected in a way that has little to do with word length - as in "normal" - 1, 2, 3 letters are grouped.





# Hugging Face

## Computer Vision



Depth Estimation



Image Classification



Object Detection



Image Segmentation



Text-to-Image



Image-to-Text



Image-to-Image



Image-to-Video



Unconditional Image Generation



Video Classification



Text-to-Video



Zero-Shot Image Classification



Mask Generation



Zero-Shot Object Detection



Text-to-3D



Image-to-3D



Image Feature Extraction



Keypoint Detection



# Speech Data





## How to learn Python programming | Guido van Rossum and Lex Fridman

Lex  
Clips

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14K



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504K views 1 year ago

Lex Fridman Podcast full episode: Guido van Rossum: Python and the Future



```
~/Documents/_meetups/pyconza 2024/code/Speech/data git:(main)±4 (1.982s)
ffmpeg -i lex_guido.mp3 -f segment -segment_time 30 -c copy -reset_timestamps 1 output%03d.mp3
```

```
ffmpeg version 7.0.2 Copyright (c) 2000-2024 the FFmpeg developers
  built with Apple clang version 15.0.0 (clang-1500.3.9.4)
configuration: --prefix=/opt/homebrew/Cellar/ffmpeg/7.0.2_1 --enable-shared --enable-pthreads --enable-version3 --cc=clang --host-cflags= --host-ldflags=' -Wl,-ld_classic' --enable-ffplay --enable-gnutls --enable-libaom --enable-libarbb24 --enable-libbluray --enable-libdav1d --enable-libharfbuzz --enable-libjxl --enable-libmp3lame --enable-libopus --enable-librav1e --enable-librist --enable-librubberband --enable-libsnappy --enable-libsrt --enable-libssh --enable-libsrtav1 --enable-libtesseract --enable-libtheora --enable-libvidstab --enable-libvmaf --enable-libvorbis --enable-libvpx --enable-libwebp --enable-libx264 --enable-libx265 --enable-libxml2 --enable-libxvid --enable-lzma --enable-libfontconfig --enable-libfreetype --enable-frei0r --enable-libass --enable-libopencore-amrnb --enable-libopencore-amrwb --enable-libopenjpeg --enable-libspeex --enable-libsoxr --enable-libzmq --enable-libzimg --disable-libjack --disable-indev=jack --enable-videotoolbox --enable-audiotoolbox --enable-neon
libavutil      59. 8.100 / 59. 8.100
libavcodec     61. 3.100 / 61. 3.100
libavformat    61. 1.100 / 61. 1.100
libavdevice    61. 1.100 / 61. 1.100
libavfilter     10. 1.100 / 10. 1.100
libswscale      8. 1.100 /  8. 1.100
libswresample   5. 1.100 /  5. 1.100
libpostproc    58. 1.100 / 58. 1.100
Input #0, mp3, from 'lex_guido.mp3':
Metadata:
  major_brand     : isom
  minor_version   : 512
  compatible_brands: isomiso2avc1mp41
  encoder         : Lavf60.3.100
Duration: 00:07:06.16, start: 0.025057, bitrate: 128 kb/s
Stream #0:0: Audio: mp3 (mp3float), 44100 Hz, stereo, fltp, 128 kb/s
Metadata:
  encoder         : Lavc60.3.
Stream mapping:
  Stream #0:0 -> #0:0 (copy)
[segment @ 0x156004080] Opening 'output000.mp3' for writing
Output #0, segment, to 'output%03d.mp3':
Metadata:
  major_brand     : isom
  minor_version   : 512
  compatible_brands: isomiso2avc1mp41
  encoder         : Lavf61.1.100
Stream #0:0: Audio: mp3, 44100 Hz, stereo, fltp, 128 kb/s
Metadata:
  encoder         : Lavc60.3.
Press [q] to stop, [?] for help
[segment @ 0x156004080] Opening 'output001.mp3' for writing
[segment @ 0x156004080] Opening 'output002.mp3' for writing
[segment @ 0x156004080] Opening 'output003.mp3' for writing
```



mp3s



- output000.mp3
- output001.mp3
- output002.mp3
- output003.mp3
- output004.mp3
- output005.mp3
- output006.mp3
- output007.mp3
- output008.mp3
- output009.mp3
- output010.mp3
- output011.mp3
- output012.mp3
- output013.mp3
- output014.mp3



# Jupyter Notebook

Transcribe.ipynb



## large model

```
[32]: transcribe_audio_file("data/mp3s/output000.mp3", model)
```



```
Start time: 2024-10-02 14:43:13.105156
```

```
/Users/alexc/Documents/_meetups/pyconza 2024/code/venv/lib/python3.11/site-packages/whisper/transcribe.py:126: UserWarning: FP16 is not supported on CPU; using FP32 instead
    warnings.warn("FP16 is not supported on CPU; using FP32 instead")
```

```
Stop time: 2024-10-02 14:43:30.313052
```

```
17.21 seconds taken
```

```
Transcribed data/mp3s/output000.mp3
```

```
Do you have advice for a programming beginner on how to learn Python the right way? Find something you actually want to do with it. If you say, I want to learn skill X, that's not enough motivation. You need to pick something and it can be...
```

```
{
    "text": " Do you have advice for a programming beginner on how to learn Python the right way? Find something you actually want to do with it. If you say, I want to learn skill X, that's not enough motivation. You need to pick something and it can be...",  

    "segments": [
```

```
17.21 seconds taken - still fast enough to do "in real time"
```



## small model

```
[33]: transcribe_audio_file("data/mp3s/output000.mp3", model_small)
```



Start time: 2024-10-02 14:43:30.317192

```
/Users/alexc/Documents/_meetups/pyconza 2024/code/venv/lib/python3.11/site-packages/whisper/transcribe.py:126: UserWarning: FP16 is not supported on CPU; using FP32 instead  
    warnings.warn("FP16 is not supported on CPU; using FP32 instead")
```

Stop time: 2024-10-02 14:43:33.806880

3.49 seconds taken

Transcribed data/mp3s/output000.mp3

Do you have advice for a programming beginner on how to learn Python the right way? Find something you actually want to do with it. If you say, I want to learn skill X, that's not enough motivation. You need to pick something and it can be a...

```
{  
    "text": " Do you have advice for a programming beginner on how to learn Python the right way? Find something you actually want to do with it. If you say, I want to learn skill X, that's not enough motivation. You need to pick something and it can be a...",  
    "segments": [  
        {"text": " Do you have advice for a programming beginner on how to learn Python the right way? Find something you actually want to do with it. If you say, I want to learn skill X, that's not enough motivation. You need to pick something and it can be a...", "start": 0, "end": 1000},  
        {"text": "...", "start": 1000, "end": 1000}  
    ]  
}
```

3.49 seconds taken

**Note 1:** the same transcription results but 5 times slower with large model

**Note 2:** small transcription model is transcribing around 10 seconds of audio per second



# Jupyter Notebook

Speech emotion recognition.ipynb

<https://github.com/mbamvianney/SPEECH-EMOTION-RECOGNITION-WITH-MACHINE-LEARNING>





# Hugging Face

## Audio



Text-to-Speech



Text-to-Audio



Automatic Speech Recognition



Audio-to-Audio



Audio Classification



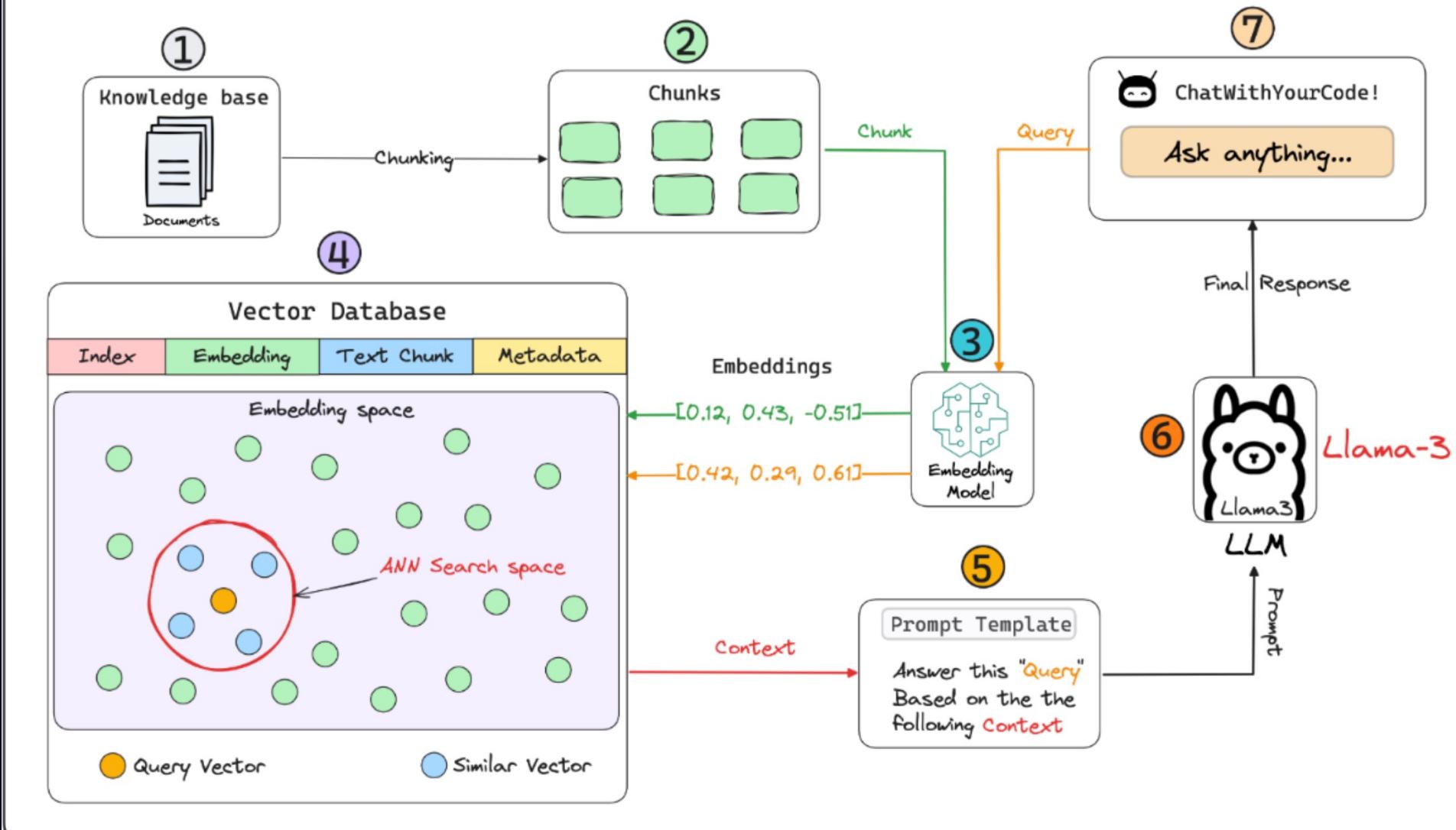
Voice Activity Detection



# Text Data



# Document Chat RAG using Llama-3!



write python code that downloads all the talks from this page:

```
<!DOCTYPE html>
<html>
<head>
  <title>Talks - PyConZA 2024</title>
  ...

```

talks.html

a talk page looks like this

```
<!DOCTYPE html>
<html>
<head>
  <title>Harnessing the Power of Community: Lessons from Speedrunning for the Python Ecosystem and Beyond - PyConZA 2024</title>
  ...

```

talk.html

- ① i need to store all talk data in a csv file with a column for each metadata item



## Applying AI with Python

Speaker: [Alex Conway](#).

Track: Data Science

Type: Talk

Room: Lefthand Room / Main Hall

Time: Oct 04 (Fri): 11:30

Duration: 0:45

Artificial Intelligence (AI) is transforming industries and our lives by enabling computers to solve increasingly complex tasks, and Python stands at the forefront of this revolution. In this talk, we will explore how Python's rich ecosystem of AI libraries and frameworks can be harnessed to quickly solve real-world problems without needing a PhD. From computer vision to time series analysis to natural language processing and AI agents, this session will demonstrate practical AI applications in real-world use cases that leverage Python's versatility so you can get started using AI right away.

By the end of the session, you will have a broad overview of AI and of the Python AI landscape together with an understanding of how Python can be used to integrate AI into your projects. The talk will provide practical examples, code snippets, and tips for getting started on building AI-driven solutions. Whether you're a beginner or an experienced developer, this talk will offer valuable insights into applying AI to solve real-world challenges with Python.

Talk Outline:

- Introduction to AI concepts
- Why Python is the go-to language for AI
- Tabular data
- Computer vision
- Time series
- Text Data
- AI Agents
- Conclusion

Key Takeaways:



# Jupyter Notebook

Scrape PyConZA2024.ipynb



Talk ID: 1  
Speaker ID: 1

--- Talk Data ---

Talk ID: 1  
Title: Applying AI with Python  
Speaker Name: Alex Conway  
Speaker Profile URL: <https://2024.za.pycon.org/users/alxcnwy/>  
Talk URL: <https://2024.za.pycon.org/talks/11-applying-ai-with-python/>

**Abstract:**

Artificial Intelligence (AI) is transforming industries and our lives by enabling computers to solve increasingly complex tasks, and Python stands at the forefront of this revolution. In this talk, we will explore how Python's rich ecosystem of AI libraries and frameworks can be harnessed to quickly solve real-world problems without needing a PhD. From computer vision to time series analysis to natural language processing and AI agents, this session will demonstrate practical AI applications in real-world use cases that leverage Python's versatility so you can get started using AI right away.

By the end of the session, you will have a broad overview of AI and of the Python AI landscape together with an understanding of how Python can be used to integrate AI into your projects. The talk will provide practical examples, code snippets, and tips for getting started on building AI-driven solutions. Whether you're a beginner or an experienced developer, this talk will offer valuable insights into applying AI to solve real-world challenges with Python.

**Talk Outline:**

- Introduction to AI concepts
- Why Python is the go-to language for AI
- Tabular data
- Computer vision
- Time series
- Text Data
- AI Agents
- Conclusion

**Key Takeaways:**

- A solid conceptual foundation for how to apply AI
- Knowledge of the Python libraries and tools useful for AI
- Realizing that you don't need to be a math genius to build with AI

--- Speaker Data ---

Photo URL: No photo available  
Twitter: <https://twitter.com/alxcnwy>  
GitHub: <https://github.com/alxcnwy>  
Bio Part 1: Twitter Profile link:<https://twitter.com/alxcnwy>  
Bio Part 2: Other Social:<https://www.linkedin.com/in/alxcnwy/>  
Bio Part 3: github profile:<https://github.com/alxcnwy>  
Bio Part 4: I am a data scientist / hacker with 25 years of coding experience. I've built several startups including my AI development agency NumberBoost and most recently AiSupervision that did Y Combinator and raised several million dollars from VCs. I recently exited that startup and am now working on applied AI via [www.numberboost.com](http://www.numberboost.com)  
Name: Alex Conway  
Profile URL: <https://2024.za.pycon.org/users/alxcnwy/>



# Jupyter Notebook

ETL – Load Documents into Database.ipynb



Below is TALK \_DATA

Use this talk data below to categorize the talks into topics. return a table with talk id and assigned topic. list the topics as bullet points with a count of talks that fit each topic

# TALK\_DATA:

Talk ID: 1

Speaker ID: 1

--- Talk Data ---

Talk ID,Title,Abstract,Speaker Name,Speaker Profile URL,Talk

URL,Speaker ID,Photo URL,Twitter,GitHub,Fediverse,Bio

1,Applying AI with Python,"Artificial Intelligence (AI) is transforming industries and our lives by enabling computers to solve increasingly complex tasks, and Python stands at the forefront of this revolution.

In this talk, we will explore how Python's rich ecosystem of AI libraries and frameworks can be harnessed to quickly solve real-world problems without needing a PhD. From computer vision to time series analysis to natural language processing and AI agents, this session will demonstrate practical AI applications in real-world use cases that leverage Python's versatility so you can get started using AI right away.

By the end of the session, you will have a broad overview of AI and of the Python AI landscape together with an understanding of how Python can be used to integrate AI into your projects. The talk will provide practical examples, code snippets, and tips for getting started on building AI-driven solutions. Whether you're a beginner or an experienced developer, this talk will offer valuable insights into

| A  | B                                       |
|----|---|
| 1  | Talk ID Assigned Topic                  |
| 2  | 1 AI and Machine Learning               |
| 3  | 2 Community and Tech Education          |
| 4  | 3 Time Series Analysis                  |
| 5  | 4 AI and Machine Learning               |
| 6  | 5 Natural Language Processing (NLP)     |
| 7  | 6 Community and Tech Education          |
| 8  | 7 Community and Tech Education          |
| 9  | 8 Community and Tech Education          |
| 10 | 9 Python Libraries and Tools            |
| 11 | 10 Web Development and Frontend         |
| 12 | 11 Data Science and Decision Engines    |
| 13 | 12 Python Libraries and Tools           |
| 14 | 13 Python Libraries and Tools           |
| 15 | 14 Python Libraries and Tools           |
| 16 | 15 Data Quality                         |
| 17 | 16 AI and Machine Learning              |
| 18 | 17 Event Streaming and Kafka            |
| 19 | 18 Community and Tech Education         |
| 20 | 19 Python Libraries and Tools           |
| 21 | 20 Robotics                             |
| 22 | 21 Open Source and Software Development |
| 23 | 22 Python Libraries and Tools           |
| 24 | 23 AI and Machine Learning              |
| 25 | 24 Python Libraries and Tools           |
| 26 | 25 IoT and MicroPython                  |
| 27 | 26 Community and Tech Education         |
| 28 | 27 Natural Language Processing (NLP)    |
| 29 | 28 Python Libraries and Tools           |
| 30 | 29 Open Source and Software Development |
| 31 | 30 Web Development and Frontend         |
| 32 | 31 Web Development and Frontend         |
| 33 | 32 Community and Tech Education         |
| 34 | 33 Community and Tech Education         |
| 35 | 34 Open Source and Software Development |
| 36 | 35 Open Source and Software Development |
| 37 | 36 Python Libraries and Tools           |
| 38 |   |



Talk ID: 1  
Speaker ID: 1

--- Talk Data ---  
Talk ID: 1  
Title: Applying AI with Python  
Speaker Name: Alex Conway  
Speaker Profile URL: <https://2024.za.pycon.org/users/alxcnwy/>  
Talk URL: <https://2024.za.pycon.org/talks/11-applying-ai-with-python/>

Abstract:  
Artificial Intelligence (AI) is transforming industries and our lives by enabling computers to solve increasingly complex tasks, and Python stands at the forefront of this revolution. In this talk, we will explore how Python's rich ecosystem of AI libraries and frameworks can be harnessed to quickly solve real-world problems without needing a PhD. From computer vision to time series analysis to natural language processing and AI agents, this session will demonstrate practical AI applications in real-world use cases that leverage Python's versatility so you can get started using AI right away.  
By the end of the session, you will have a broad overview of AI and of the Python AI landscape together with an understanding of how Python can be used to integrate AI into your projects. The talk will provide practical examples, code snippets, and tips for getting started on building AI-driven solutions. Whether you're a beginner or an experienced developer, this talk will offer valuable insights into applying AI to solve real-world challenges with Python.

Talk Outline:  
Introduction to AI concepts  
Why Python is the go-to language for AI  
Tabular data  
Computer vision  
Time series  
Text Data  
AI Agents  
Conclusion

Key Takeaways:  
A solid conceptual foundation for how to apply AI  
Knowledge of the Python libraries and tools useful for AI  
Realizing that you don't need to be a math genius to build with AI

--- Speaker Data ---  
Photo URL: No photo available  
Twitter: <https://twitter.com/alxcnwy>  
GitHub: <https://github.com/alxcnwy>  
Bio Part 1: Twitter Profile link:<https://twitter.com/alxcnwy>  
Bio Part 2: Other Social:<https://www.linkedin.com/in/alxcnwy>  
Bio Part 3: GitHub profile:<https://github.com/alxcnwy>  
Bio Part 4: I am a data scientist / hacker with 25 years of coding experience. I've built several startups including my AI development agency NumberBoost and most recently AiSupervision that did Y Combinator and raised several million dollars from VCs. I recently exited that startup and am now working on applied AI via [www.numberboost.com](http://www.numberboost.com)  
Name: Alex Conway  
Profile URL: <https://2024.za.pycon.org/users/alxcnwy/>

--- Github ---  
speaker\_id: 1  
~~github\_url~~: <https://github.com/alxcnwy>  
username: alxcnwy  
name: Alex Conway  
public\_repos: 18  
total\_stars: 104  
most\_starred\_repo\_name: Deep-Neural-Networks-for-Video-Classification  
most\_starred\_repo\_stars: 44  
last\_commit\_datetime: 2024-10-02T11:26:04+00:00  
hours\_since\_last\_commit: 2.1146393786111113  
followers: 44  
following: 15  
created\_at: 2014-09-02T18:24:14+00:00  
company:  
bio: making something people want | ♀ B |  
~~ycombinator~~  
W22 | won awards for AI projects from companies like Mercedes-Benz, NTT Japan, etc  
location: Cape Town  
blog: [www.numberboost.com](http://www.numberboost.com)  
email:

# Use RAG

```
[7]: print(qa_chain.run("What is the main topic of the documents [<10 words]"))
```

The main topic of the documents is the abstracts and speaker details for several talks at a Python conference.

```
• [5]: print(qa_chain.run("Are there any talks about artificial intelligence?"))
```

Yes, there are several talks about artificial intelligence:

1. "Applying AI with Python" by Alex Conway. In this talk, the speaker will explore how Python's rich ecosystem of AI libraries and frameworks can be harnessed to quickly solve real-world problems. The session will demonstrate practical AI applications in real-world use cases that leverage Python's versatility. More details can be found [here](<https://2024.za.pycon.org/talks/11-applying-ai-with-python/>).

2. "Differentiation Engines: The Elves behind the AI Christmas" by Rajdeep Singh. This talk will provide a good overview of the different mathematical differentiation techniques and libraries within the Python ecosystem. It will also provide an in-depth look at what powers modern machine learning frameworks. More details can be found [here](<https://2024.za.pycon.org/talks/23-differentiation-engines-the-elves-behind-the-ai-christmas/>).

3. "Building a Decisioning Engine for Data Scientists: A Practical Guide" by Sholto Armstrong. This talk will introduce a new open-source decisioning framework built on Hamilton, a versatile framework designed to streamline the creation and management of dataflows using standard Python functions. More details can be found [here](<https://2024.za.pycon.org/talks/37-building-a-decisioning-engine-for-data-scientists-a-practical-guide/>).

```
• [6]: print(qa_chain.run("How many talks are there about artificial intelligence?"))
```

There are three talks about artificial intelligence. These are:

1. "Applying AI with Python" by Alex Conway
2. "& robotics for all!" by :David Campey
3. "Differentiation Engines: The Elves behind the AI Christmas" by Rajdeep Singh





# Hugging Face

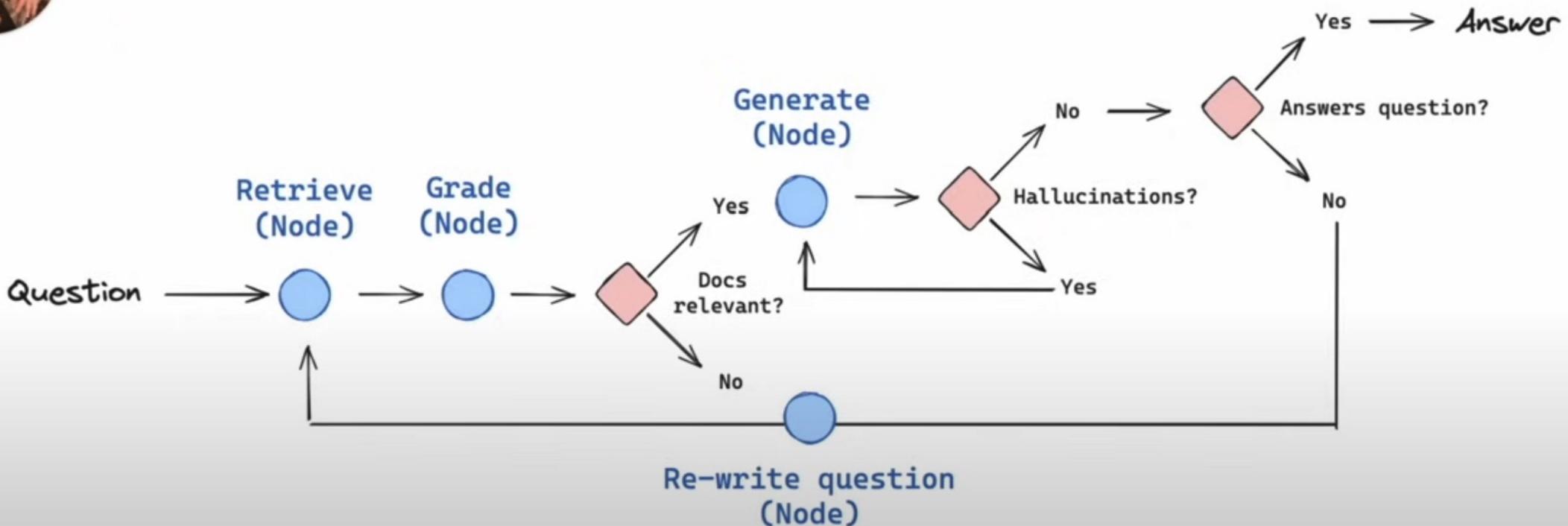
## Natural Language Processing

[Text Classification](#)[Token Classification](#)[Table Question Answering](#)[Question Answering](#)[Zero-Shot Classification](#)[Translation](#)[Summarization](#)[Feature Extraction](#)[Text Generation](#)[Text2Text Generation](#)[Fill-Mask](#)[Sentence Similarity](#)

# AI Agents



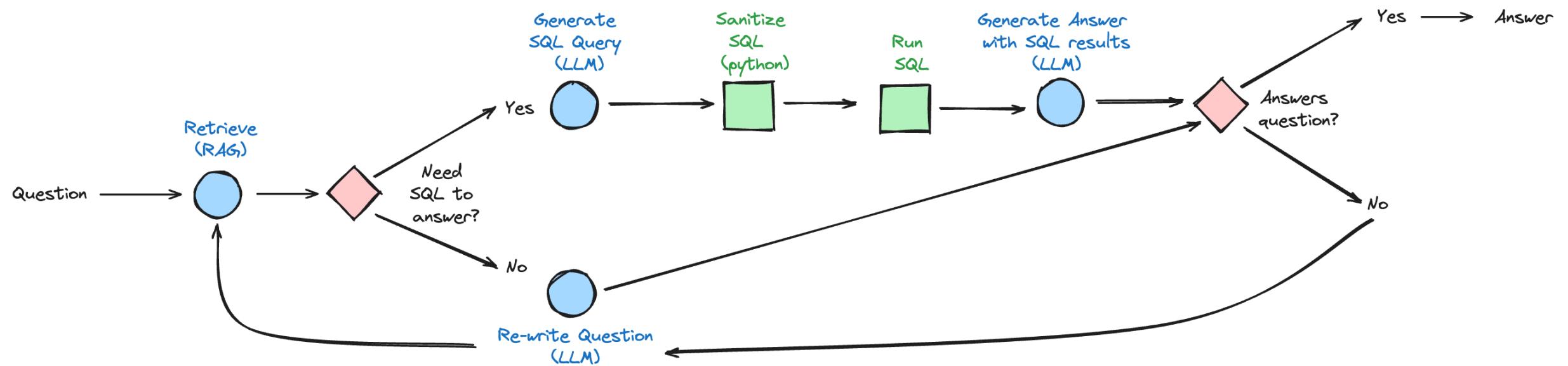
## Reasoning: Use reasoning / self-reflection around RAG



```
question = "How many talks are there about artificial intelligence?"
```

**Remember the RAG model failed at this...**





# Load structured data into SQLite

```
# Normalize column names function
def normalize_column_names(df):
    df.columns = df.columns.str.strip().str.lower().str.replace(' ', '_').str.replace('(', '').str.replace(')', '')
    return df

# Load CSV files into Pandas DataFrames
github_df = pd.read_csv('data/github.csv')
speakers_df = pd.read_csv('data/speakers.csv')
talks_df = pd.read_csv('data/talks.csv')
topics_df = pd.read_csv('data/topics.csv')

# Normalize column names
github_df = normalize_column_names(github_df)
speakers_df = normalize_column_names(speakers_df)
talks_df = normalize_column_names(talks_df)
topics_df = normalize_column_names(topics_df)

# Create a SQLite connection
conn = sqlite3.connect('data/conference_data.db')

# Save the dataframes to SQLite
github_df.to_sql('github', conn, if_exists='replace', index=False)
speakers_df.to_sql('speakers', conn, if_exists='replace', index=False)
talks_df.to_sql('talks', conn, if_exists='replace', index=False)
topics_df.to_sql('topics', conn, if_exists='replace', index=False)
```



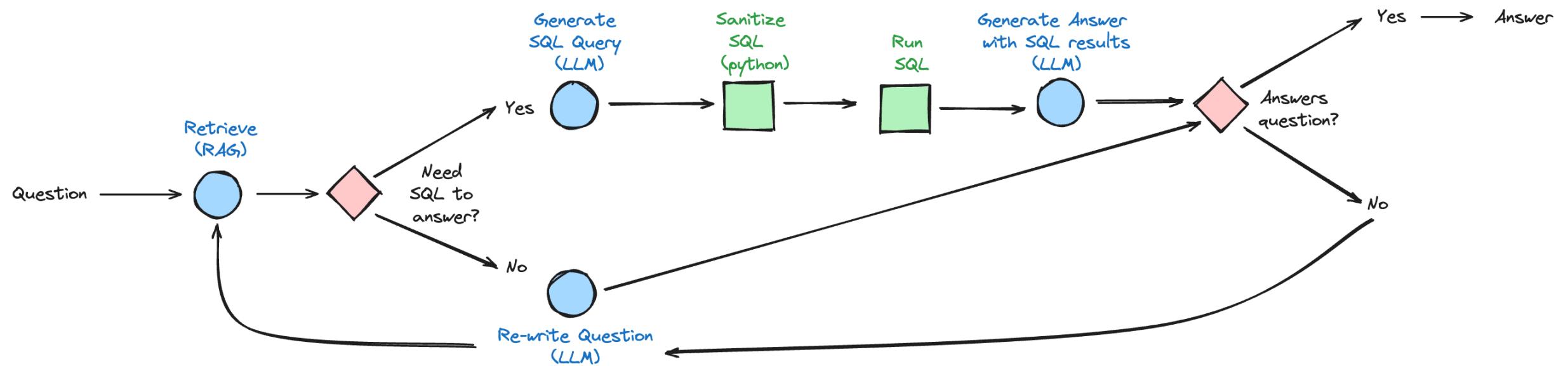
|    | talk_id | title   | abstract   | speaker_name     | speaker_profile_url   | talk_url   | speaker_id |
|----|---------|---|--|------------------|---|--|------------|
| 1  | 1       | Applying AI with Python   | Artificial Intelligence (AI) is transforming industries and ...                                      | Alex Conway      | <a href="https://2024.za.pycon.org/users/alxcnwy/">https://2024.za.pycon.org/users/alxcnwy/</a>                   | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 1          |
| 2  | 2       | Harnessing the Power of Community: Lessons from ...             | Speedrunning, the art of completing video games as quickl...   | Nunudzai Mrewa   | <a href="https://2024.za.pycon.org/users/JustNunuz/">https://2024.za.pycon.org/users/JustNunuz/</a>               | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 2          |
| 3  | 3       | It's About Time: Time-Series Forecasting with Darts             | Along with the rise of "AI", data-driven decision-making in ...                                      | Brenden Taylor   | <a href="https://2024.za.pycon.org/users/brenden.taylor22/">https://2024.za.pycon.org/users/brenden.taylor22/</a> | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 3          |
| 4  | 4       | Monitoring and Evaluating LLM Apps with Langfuse                | Overview....   | Ruan Pretorius   | <a href="https://2024.za.pycon.org/users/ruankie/">https://2024.za.pycon.org/users/ruankie/</a>                   | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 4          |
| 5  | 5       | Leveraging the NLTK library for Translation: A Case Study...    | In the field of natural language processing (NLP), ...   | Alta Saunders    | <a href="https://2024.za.pycon.org/users/zietsmana/">https://2024.za.pycon.org/users/zietsmana/</a>               | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 5          |
| 6  | 6       | Creating Personalised Images with Python's Stable Diffusion     | Title...   | NULL             | NULL  | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 6          |
| 7  | 7       | Mental Illness and Vulnerability in Tech                        | In his seminal "Noonday Demon: An Atlas of Depression", ...  | Schalk Venter    | <a href="https://2024.za.pycon.org/users/schalkventer/">https://2024.za.pycon.org/users/schalkventer/</a>         | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 6          |
| 8  | 8       | Bridging Language Barriers: Making Programming ...              | In a diverse and multilingual country like South Africa, th...                                       | Mthetho Sovara   | <a href="https://2024.za.pycon.org/users/msovara/">https://2024.za.pycon.org/users/msovara/</a>                   | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 7          |
| 9  | 9       | Level up your developer experience with Kubernetes              | In today's fast-paced development landscape, the efficienc...  | Roché Compaan    | <a href="https://2024.za.pycon.org/users/rochecompaan/">https://2024.za.pycon.org/users/rochecompaan/</a>         | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 8          |
| 10 | 10      | A Novel Way of Creating Multi-Tenant Apps using Django.....     | Imagine building a software-as-a-service platform where ...  | Shaun De Ponte   | <a href="https://2024.za.pycon.org/users/nawtybean3d/">https://2024.za.pycon.org/users/nawtybean3d/</a>           | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 9          |
| 11 | 11      | Building a Decisioning Engine for Data Scientists: A ...        | Machine learning offers a modern replacement for...  | Sholto Armstrong | <a href="https://2024.za.pycon.org/users/sjnarmstrong/">https://2024.za.pycon.org/users/sjnarmstrong/</a>         | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 10         |
| 12 | 12      | Implementing an HPy Backend for Cython                          | HPy ( <a href="https://hpyproject.org/">https://hpyproject.org/</a> ) is a new API for extending ... | Du Toit Spies    | <a href="https://2024.za.pycon.org/users/DuToitSpies/">https://2024.za.pycon.org/users/DuToitSpies/</a>           | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 11         |
| 13 | 13      | Streamlining HPC Operations: Integrating Django Helpdes...      | Django helpdesk is a general purpose ticketing system that...  | Binjamin Barsch  | <a href="https://2024.za.pycon.org/users/bbarsch/">https://2024.za.pycon.org/users/bbarsch/</a>                   | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 12         |
| 14 | 14      | You don't need a data service, you just need an object store... | What are you talking about?...   | Gordon Inggs     | <a href="https://2024.za.pycon.org/users/...">https://2024.za.pycon.org/users/...</a>                             | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 13         |
| 15 | 15      | Great Expectations About Data Quality                           | A story about the City of Cape Town Data Science Branch's...   | Ariella Rink     | <a href="https://2024.za.pycon.org/users/AriellaRink/">https://2024.za.pycon.org/users/AriellaRink/</a>           | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 14         |
| 16 | 16      | Made you look: Using Siamese Neural Networks for Buildin...     | What is this talk about?...  | Jolanda Becker   | <a href="https://2024.za.pycon.org/users/jolanda/">https://2024.za.pycon.org/users/jolanda/</a>                   | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 15         |
| 17 | 17      | Kafka in practice: Lessons learned at Takealot                  | Overview....   | Johan Beyers     | <a href="https://2024.za.pycon.org/users/johan_beyers/">https://2024.za.pycon.org/users/johan_beyers/</a>         | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 16         |
| 18 | 18      | Power to the people who teach the people to code                | Teaching people to code is...tricky....  | Sheena O'Connell | <a href="https://2024.za.pycon.org/users/sheena/">https://2024.za.pycon.org/users/sheena/</a>                     | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 17         |
| 19 | 19      | Adventures in Garbage Collection                                | Most of the time, garbage collection is an invisible process ...                                     | Bruce Merry      | <a href="https://2024.za.pycon.org/users/bmerry/">https://2024.za.pycon.org/users/bmerry/</a>                     | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 18         |
| 20 | 20      | & robotics for all!   | Coding & robotics is the new subject in the DBE ...  | :David Campey    | <a href="https://2024.za.pycon.org/users/campey/">https://2024.za.pycon.org/users/campey/</a>                     | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 19         |
| 21 | 21      | Maintaining a PLC communication library called python-...       | Python-snap7 is a Python library that enables seamless ...   | Gijs Molenaar    | <a href="https://2024.za.pycon.org/users/gijsm/">https://2024.za.pycon.org/users/gijsm/</a>                       | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 20         |
| 22 | 22      | Duck, Duck, Python: OLAP Data with DuckDB                       | ➲ DuckDB is an in-process OLAP SQL database that can u...  | Luis de Sousa    | <a href="https://2024.za.pycon.org/users/luisdza/">https://2024.za.pycon.org/users/luisdza/</a>                   | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 21         |
| 23 | 23      | Differentiation Engines: The Elves behind the AI Christmas      | What do all recent advancements in LLMs, Computer Visio...   | Rajdeep Singh    | <a href="https://2024.za.pycon.org/users/singhsegv/">https://2024.za.pycon.org/users/singhsegv/</a>               | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 22         |
| 24 | 24      | Accelerate your pandas workload using FireDucks at zero ...     | In general, a Data Scientist spends significant efforts in ...                                       | Sourav Saha      | <a href="https://2024.za.pycon.org/users/qsourcev/">https://2024.za.pycon.org/users/qsourcev/</a>                 | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 23         |
| 25 | 25      | Sensor data processing on microcontrollers with ...             | Being able to measure physical phenomena is critical to ...  | Jon Nordby       | <a href="https://2024.za.pycon.org/users/jonnor/">https://2024.za.pycon.org/users/jonnor/</a>                     | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 24         |
| 26 | 26      | Building a Thriving Tech Community                              | Description of the Talk...   | Adeline Makokha  | <a href="https://2024.za.pycon.org/users/amakokha/">https://2024.za.pycon.org/users/amakokha/</a>                 | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 25         |
| 27 | 27      | Building a Code Search Engine: Using NLP to Find Similar ...    | A developer may decide to implement a library despite the...   | Divya Rani       | <a href="https://2024.za.pycon.org/users/Divya063/">https://2024.za.pycon.org/users/Divya063/</a>                 | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 26         |
| 28 | 28      | Beyond the Pause: Exploring the Inner Workings of Python...     | This talk is designed for Python developers who want to ...  | Rupali Kavale    | <a href="https://2024.za.pycon.org/users/...">https://2024.za.pycon.org/users/...</a>                             | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 27         |
| 29 | 29      | Exploring the Adoption & Role of Open Source Software in ...    | The adoption of...   | Robson Kanhalelo | <a href="https://2024.za.pycon.org/users/Kanhalelo/">https://2024.za.pycon.org/users/Kanhalelo/</a>               | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 28         |
| 30 | 30      | Using Coding Skills to Make Passive Income                      | In 2017, I stepped down from my job as CTO of a 150 perso...   | Cory Zue         | <a href="https://2024.za.pycon.org/users/czue/">https://2024.za.pycon.org/users/czue/</a>                         | <a href="https://2024.za.pycon.org/talks/">https://2024.za.pycon.org/talks/...</a> | 29         |

| speaker_id | github_url                           | username       | name              | public_repos | total_stars | most_starred_repo_name                        | most_starred_repo_stars | last_commit_d     |
|------------|--------------------------------------|----------------|-------------------|--------------|-------------|---|-------------------------|-------------------|
| Filter     | Filter                               | Filter         | Filter            | Filter       | Filter      | Filter  | Filter                  | Filter            |
| 1          | 8 https://github.com/sixfeetup       | sixfeetup      | Six Feet Up       | 127          | 210         | scaf  | 79                      | 2024-09-25T17:04: |
| 2          | 20 https://github.com/gijzelaerr     | gijzelaerr     | Gijs Molenaar     | 172          | 748         | python-snap7                                  | 648                     | 2024-09-17T16:20: |
| 3          | 21 https://github.com/luisdza        | luisdza        | Luis de Sousa     | 8            | 3           | aerialmzansi-website                          | 3                       | 2024-08-22T13:24: |
| 4          | 22 https://github.com/singhsegv      | singhsegv      | Rajdeep           | 56           | 51          | kitaab_bot                                    | 12                      | 2024-09-23T09:53: |
| 5          | 32 https://github.com/drnlm          | drnlm          | Neil Muller       | 30           | 5           | matplotlib-py3                                | 1                       | 2024-09-29T14:11: |
| 6          | 26 https://github.com/Divya063       | Divya063       | Divya Rani        | 190          | 17          | distributedKV                                 | 4                       | 2024-08-29T13:34: |
| 7          | 25 https://github.com/adeline-pepela | adeline-pepela | Adeline Makokha   | 39           | 0           | NULL  | 0                       | 2024-09-16T12:50: |
| 8          | 31 https://github.com/sheenarbw      | sheenarbw      | sheenarbw         | 76           | 22          | tutorial-airflow                              | 6                       | 2024-10-02T13:00: |
| 9          | 17 https://github.com/sheenarbw      | sheenarbw      | sheenarbw         | 76           | 22          | tutorial-airflow                              | 6                       | 2024-10-02T13:00: |
| 10         | 29 https://github.com/czue           | czue           | Cory Zue          | 67           | 1016        | celery-progress                               | 464                     | 2024-09-26T13:58: |
| 11         | 30 https://github.com/sheenarbw      | sheenarbw      | sheenarbw         | 76           | 22          | tutorial-airflow                              | 6                       | 2024-09-23T12:49: |
| 12         | 24 https://github.com/emlearn        | emlearn        | NULL              | 2            | 546         | emlearn                                       | 483                     | 2024-10-01T00:07: |
| 13         | 13 https://github.com/cityofcapetown | cityofcapetown | City of Cape Town | 44           | 20          | loadshedding-signal-bot                       | 4                       | 2024-09-28T11:56: |
| 14         | 27 https://github.com/coderquill     | coderquill     | Rupali Kavale     | 75           | 3           | topstar                                       | 3                       | 2024-09-23T00:53: |
| 15         | 28 https://github.com/Kanhalelor     | Kanhalelor     | Robson            | 54           | 2           | CSS-Flexbox-Layout                            | 1                       | 2024-07-12T12:31: |
| 16         | 1 https://github.com/alxcnwy         | alxcnwy        | Alex Conway       | 18           | 104         | Deep-Neural-Networks-for-Video-Classification | 44                      | 2024-10-02T11:26: |
| 17         | 16 https://github.com/jbeyers        | jbeyers        | Johan Beyers      | 42           | 57          | django-prelaunch                              | 36                      | 2024-08-14T04:57: |
| 18         | 2 https://github.com/JustNunuz       | JustNunuz      | Nunudzai Mrewa    | 10           | 0           | NULL  | 0                       | 2024-09-13T13:33: |
| 19         | 11 https://github.com/DuToitSpies    | DuToitSpies    | Du Toit Spies     | 11           | 1           | cython  | 1                       | 2024-08-10T18:13: |
| 20         | 12 https://github.com/kode2go        | kode2go        | kode2go           | 74           | 7           | nithecs                                       | 2                       | 2024-06-01T22:11: |
| 21         | 6 https://github.com/schalkventer    | schalkventer   | Schalk Venter     | 171          | 165         | schalkventer.me                               | 17                      | 2024-09-29T08:11: |
| 22         | 10 https://github.com/sjnarmstrong   | sjnarmstrong   | Sholto Armstrong  | 27           | 131         | gray-code-structured-light                    | 112                     | 2024-04-09T17:40: |
| 23         | 9 https://github.com/nawtybean       | nawtybean      | Shaun De Ponte    | 16           | 4           | KickstarterPrediction                         | 3                       | 2024-09-25T11:53: |
| 24         | 4 https://github.com/ruankie         | ruankie        | Ruan Pretorius    | 71           | 112         | ecrivai                                       | 68                      | 2024-10-02T00:42: |

# Jupyter Notebook

Agent.ipynb





```
def agent(question, max_retries=2):
    attempt = 0
    answers_question = "no"
    while answers_question.lower() != "yes" and attempt < max_retries:
        attempt += 1
        if attempt > 1:
            print(f"> Rewriting question {attempt}: {question}")
            clear_notebook_output()
        # figure out if SQL or LLM question
        prompt_decide_LLM_or_SQL = get_prompt_decide_LLM_or_SQL(question)
        question_type = run_chat_query(prompt_decide_LLM_or_SQL)
        # reasoning
        if question_type == "SQL":
            print("Using SQL to inform answer")
            # write sql query
            prompt_write_SQL_query_for_question = get_prompt_write_SQL_query_for_question(question)
            sql_query = run_chat_query(prompt_write_SQL_query_for_question)

            # query sql database
            sql_query = sanitize_sql_query(sql_query)
            print(f"> Running SQL Query: {sql_query}")
            sql_results = run_sql_query(sql_query)

            # construct answer with insights from the data
            prompt_analyze_sql = get_prompt_analyze_sql(question, sql_results)
            answer = print_markdown(run_chat_query(prompt_analyze_sql))
        else:
            print("Using RAG to inform answer")
            # use RAG to answer
            prompt_analyze_llm = get_prompt_analyze_llm(question)
            answer = print_markdown(run_chat_query(prompt_analyze_llm))

        # check if answer actually answers the question
        prompt_analyze_llm = get_prompt_check_answer(question, answer)
        answers_question = str(run_chat_query(prompt_analyze_llm))

        # rewrite question
        prompt_analyze_llm = get_prompt_rewrite_question(question)
        question = run_chat_query(prompt_analyze_llm)

    return answer
```



```
: prompt_analyze_llm = get_prompt_analyze_llm(question)

print_markdown(run_chat_query(prompt_analyze_llm))
```

Based on the provided documents, there is **1 talk** specifically about artificial intelligence:

- **Talk Title:** Applying AI with Python
  - **Speaker:** Alex Conway
  - **Talk URL:** [Applying AI with Python](#)
  - **Abstract Summary:** This talk explores how Python can be used to solve real-world problems using AI, covering areas like computer vision, time series, natural language processing, and AI agents.

fails as expected

# Wrong!



```
agent("How many talks are there about artificial intelligence?")
```

Using SQL to inform answer

- There are 4 distinct talks about artificial intelligence at the conference.

```
COUNT(DISTINCT t.talk_id)
```

---

4

## Insights

- With 4 talks focused on artificial intelligence, it suggests a strong interest in this field at the conference.
- The diversity of AI topics could provide a comprehensive overview for attendees interested in various AI applications and techniques.
- This indicates that AI is a significant area of focus and likely a key theme of the conference.

# Correct!



```
agent("Which speaker has the oldest github account?")
```

Using SQL to inform answer

**Answer:**

- The speaker with the oldest GitHub account is Cory Zue.

**SQL Results:**

| Name     | Created At                |
|----------|---------------------------|
| Cory Zue | 2009-03-24T15:34:08+00:00 |

## Insights

- Cory Zue has had a GitHub account since March 24, 2009.
- This indicates a long-standing experience with GitHub and possibly a wealth of coding and project management experience on the platform.



```
agent("What is the most popular topic?")
```

Using SQL to inform answer

## Most Popular Topic

- **Python Libraries and Tools** is the most popular topic with a count of 9.

## SQL Results

| assigned_topic             | topic_count |
|----------------------------|-------------|
| Python Libraries and Tools | 9           |

## Insights

- **Popularity:** The topic "Python Libraries and Tools" is the standout focus, indicating a strong interest in this area within the conference.
- **Relevance:** This suggests that speakers and attendees are particularly keen on discussing and learning about the various libraries and tools available in Python, reflecting its significance in current Python development and application trends.



```
agent("Which 5 talks should I go to if I am interested in data science?")
```

Using RAG to inform answer

Based on the provided context, here are five talks you should consider attending if you're interested in data science:

### **1. Building a Decisioning Engine for Data Scientists: A Practical Guide**

- Speaker: Sholto Armstrong
- Focuses on creating decision flows using an open-source decisioning framework built on Hamilton.
- Topics include fraud detection, credit granting, and integration with large-language models.

### **2. Accelerate your pandas workload using FireDucks at zero manual effort**

- Speaker: Sourav Saha
- Introduces FireDucks, a high-performance library to optimize pandas workloads automatically.
- Discusses challenges and solutions for large-scale data analysis using pandas.

### **3. Duck, Duck, Python: OLAP Data with DuckDB**

- Speaker: Luis de Sousa
- Explores DuckDB, an OLAP SQL database for efficient data analysis.
- Highlights its integration with Pandas and performance benefits over other libraries.

### **4. Great Expectations About Data Quality**

- Speaker: Ariella Rink
- Discusses a framework for measuring and monitoring data quality developed by the City of Cape Town Data Science Branch.
- Evaluates popular data quality packages and custom approaches.

These talks cover a range of data science topics, including data quality, performance optimization, decision-making processes, and efficient data analysis.



```
agent("Which speakers have committed code to github this week?")
```



Using SQL to inform answer

> Running SQL Query: SELECT s.name FROM github g JOIN speakers s ON g.speaker\_id = s.speaker\_id WHERE g.hours\_since\_last\_commit <= 168

Based on the recent code commits to GitHub within the past seven days, the following speakers have made contributions:

- Roché Compaan
- Neil Muller
- Sheena O'Connell
- Cory Zue
- Jon Nordby
- Gordon Inggs
- Alex Conway
- Schalk Venter
- Ruan Pretorius



# Conclusion



```
def ai_model(input):  
    #  
    # algorithms f(input) = output  
    #  
    return output
```



```
def ai_model(input):  
    #  
    #  
    #  
    return output
```



# Thank You!

Alex Conway

[alex@numberboost.com](mailto:alex@numberboost.com)

[x.com/alxchnwy](http://x.com/alxchnwy)