

```

import pandas as pd
import spacy
from transformers import pipeline
from flair.models import TARSClassifier
from flair.data import Sentence

# Load spaCy model
nlp = spacy.load("en_core_web_sm")

# Load Transformers QA models
bert_qa = pipeline("question-answering", model="deepset/bert-base-cased-squad2")
roberta_qa = pipeline("question-answering", model="deepset/roberta-base-squad2")
zero_shot = pipeline("zero-shot-classification")

# Load Flair's TARS model
tars = TARSClassifier.load('tars-base')

# Load Excel file
df = pd.read_excel(r"/content/Job Descriptions.xlsx")

# Ensure column is named properly
jd_col = 'Job Descriptions'
df = df[[jd_col]].dropna()

# Question to ask
question = "How many years of experience is required for this job?"

# Technique 1: spaCy NER
def extract_spacy_ner(text):
    doc = nlp(text)
    results = []
    for ent in doc.ents:
        if ent.label_ in ["CARDINAL", "QUANTITY", "DATE"] and "year" in ent.text.lower():
            results.append(ent.text)
    return "; ".join(results) if results else None

# Technique 2: spaCy Dependency Parsing
def extract_spacy_dep(text):
    doc = nlp(text)
    for token in doc:
        if token.text.lower() in ['experience', 'exp']:
            for child in token.children:
                if child.dep_ in ['nummod', 'amod']:
                    return child.text + " years"
    return None

# Technique 3: BERT QA
def extract_bert_qa(text):
    try:
        result = bert_qa(question=question, context=text)
        return result['answer']
    except:
        return None

# Technique 4: RoBERTa QA
def extract_roberta_qa(text):
    try:
        result = roberta_qa(question=question, context=text)
        return result['answer']
    except:
        return None

# Technique 5: Zero-Shot QA (Prompt)
def extract_zero_shot(text):
    try:
        candidate_labels = ["1 year", "2 years", "3 years", "5 years", "more than 5 years", "no experience"]
        result = zero_shot(text, candidate_labels)
        return result['labels'][0]
    except:
        return None

# Technique 6: TARS Few-shot
def extract_tars(text):
    try:
        sentence = Sentence(text)
        tars.predict_zero_shot(sentence, candidate_labels=["1 year", "2 years", "3 years", "5 years", "10 years"])
        return sentence.labels[0].value
    except:
        return None

```

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# Apply all models (limit to first 200 rows)
df = df.head(200)
df["spaCy_NER"] = df[jd_col].apply(extract_spacy_ner)
df["spaCy_DepParse"] = df[jd_col].apply(extract_spacy_dep)
df["BERT_QA"] = df[jd_col].apply(extract_bert_qa)
df["RoBERTa_QA"] = df[jd_col].apply(extract_roberta_qa)
df["ZeroShot_QA"] = df[jd_col].apply(extract_zero_shot)
df["TARS_QA"] = df[jd_col].apply(extract_tars)

# Save the result to Excel
df.to_excel("Experience_Extraction_Output.xlsx", index=False)
```

→ /usr/local/lib/python3.11/dist-packages/huggingface_hub/utils/_auth.py:94: UserWarning:
The secret `HF_TOKEN` does not exist in your Colab secrets.
To authenticate with the Hugging Face Hub, create a token in your settings tab (<https://huggingface.co/settings/tokens>), set it as :
You will be able to reuse this secret in all of your notebooks.
Please note that authentication is recommended but still optional to access public models or datasets.

warnings.warn(
config.json: 100% 508/508 [00:00<00:00, 24.0kB/s]
model.safetensors: 100% 433M/433M [00:01<00:00, 284MB/s]
Some weights of the model checkpoint at deepset/bert-base-cased-squad2 were not used when initializing BertForQuestionAnswering: ['t
- This IS expected if you are initializing BertForQuestionAnswering from the checkpoint of a model trained on another task or with :
- This IS NOT expected if you are initializing BertForQuestionAnswering from the checkpoint of a model that you expect to be exactly
tokenizer_config.json: 100% 152/152 [00:00<00:00, 17.0kB/s]
vocab.txt: 100% 213k/213k [00:00<00:00, 1.30MB/s]
special_tokens_map.json: 100% 112/112 [00:00<00:00, 12.1kB/s]
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No model was supplied, defaulted to facebook/bart-large-mnli and revision d7645e1 (<https://huggingface.co/facebook/bart-large-mnli>)
Using a pipeline without specifying a model name and revision in production is not recommended.
config.json: 100% 1.15k/1.15k [00:00<00:00, 120kB/s]
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100%|██████████| 418M/418M [00:13<00:00, 33.1MB/s]2025-04-10 16:05:24,490 copying /tmp/tmp42p4sjcb to cache at /root/.flair/models/t
2025-04-10 16:05:36,551 removing temp file /tmp/tmp42p4sjcb
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config.json: 100% 570/570 [00:00<00:00, 63.5kB/s]
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tokenizer.json: 100% 466k/466k [00:00<00:00, 4.84MB/s]
2025-04-10 16:05:44,716 TARS initialized without a task. You need to call .add_and_switch_to_new_task() before training this model

!pip install flair

```
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Collecting conllu<5.0.0,>=4.0 (from flair)
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Requirement already satisfied: urllib3!=2.2.0, <3, >=1.25.4 in /usr/local/lib/python3.11/dist-packages (from botocore<1.38.0, >=1.37.3)
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Downloading botocore-1.37.31-py3-none-any.whl (13.5 MB)
    13.5/13.5 MB 68.3 MB/s eta 0:00:00
Downloading jmespath-1.0.1-py3-none-any.whl (20 kB)
Downloading jsonlines-4.0.0-py3-none-any.whl (8.7 kB)
Downloading numpy-1.26.4-cp311-cp311-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (18.3 MB)
    18.3/18.3 MB 54.1 MB/s eta 0:00:00
Downloading s3transfer-0.11.4-py3-none-any.whl (84 kB)
    84.4/84.4 kB 9.4 MB/s eta 0:00:00
Building wheels for collected packages: langdetect, pptree, sqllitedict, wikipedia-api, docopt, intervaltree
Building wheel for langdetect (setup.py) ... done
Created wheel for langdetect: filename=langdetect-1.0.9-py3-none-any.whl size=993223 sha256=2000588069e6bf90f6463712a44a11013237cc
Stored in directory: /root/.cache/pip/wheels/0a/f2/b2/5ca405801e05eb7c8ed5b3b4bc1fcabdc6272c167640072e
Building wheel for pptree (setup.py) ... done
Created wheel for pptree: filename=pptree-3.1-py3-none-any.whl size=4609 sha256=3fe063c203e4d7031f96fd971f4734792e0f95be5f501eb54t
Stored in directory: /root/.cache/pip/wheels/68/8a/eb/d683aa6d09dc68ebfde2f37566ddc8807837c4415b4fd2b04c
Building wheel for sqllitedict (setup.py) ... done
Created wheel for sqllitedict: filename=sqllitedict-2.1.0-py3-none-any.whl size=16862 sha256=d7f2a43c54797a99310c743ca2f70212ad7a08:
Stored in directory: /root/.cache/pip/wheels/73/63/89/7210274f9b7fb03b8f22671f64c0e0b55083d30c3c046a3ff
Building wheel for wikipedia-api (setup.py) ... done
Created wheel for wikipedia-api: filename=Wikipedia-API-0.8.1-py3-none-any.whl size=15383 sha256=6b9e94c908d47fa6bad6351ad4a3c3b7e
Stored in directory: /root/.cache/pip/wheels/0b/0f/39/e8214ec038cd5aeb8c82b957289f2f3ab2251febae5c2860
Building wheel for docopt (setup.py) ... done
Created wheel for docopt: filename=docopt-0.6.2-py2.py3-none-any.whl size=13706 sha256=f1bc66797bc21629b0e7242888b0d6cbd157360c9c
Stored in directory: /root/.cache/pip/wheels/1a/b0/8c/4b75c4116c31f83c8f0a47231251a133c74481cc4a78b0ca

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Stored in directory: /root/.cache/pip/wheels/10/60/8c/70/3c1a6c1f78cac19a693bd40ecb8365d2f4613318c145ec9816
Building wheel for intervaltree (setup.py) ... done
Created wheel for intervaltree: filename=intervaltree-3.1.0-py2.py3-none-any.whl size=26098 sha256=a22f18bb0bc6580fe1f235890b55c17
Stored in directory: /root/.cache/pip/wheels/31/d7/d9/eec6891f78cac19a693bd40ecb8365d2f4613318c145ec9816
Successfully built langdetect pptree sqlitedict wikipedia-api docopt intervaltree
Installing collected packages: sqlitedict, pptree, docopt, segtok, nvidia-nvjitlink-cu12, nvidia-curand-cu12, nvidia-cufft-cu12, nvi
Attempting uninstall: nvidia-nvjitlink-cu12
Found existing installation: nvidia-nvjitlink-cu12 12.5.82
Uninstalling nvidia-nvjitlink-cu12-12.5.82:
Successfully uninstalled nvidia-nvjitlink-cu12-12.5.82
Attempting uninstall: nvidia-curand-cu12
Found existing installation: nvidia-curand-cu12 10.3.6.82
Uninstalling nvidia-curand-cu12-10.3.6.82:
Successfully uninstalled nvidia-curand-cu12-10.3.6.82
Attempting uninstall: nvidia-cufft-cu12
Found existing installation: nvidia-cufft-cu12 11.2.3.61
Uninstalling nvidia-cufft-cu12-11.2.3.61:
Successfully uninstalled nvidia-cufft-cu12-11.2.3.61
Attempting uninstall: nvidia-cuda-runtime-cu12
Found existing installation: nvidia-cuda-runtime-cu12 12.5.82
Uninstalling nvidia-cuda-runtime-cu12-12.5.82:
Successfully uninstalled nvidia-cuda-runtime-cu12-12.5.82
Attempting uninstall: nvidia-cuda-nvrtc-cu12
Found existing installation: nvidia-cuda-nvrtc-cu12 12.5.82
Uninstalling nvidia-cuda-nvrtc-cu12-12.5.82:
Successfully uninstalled nvidia-cuda-nvrtc-cu12-12.5.82
Attempting uninstall: nvidia-cuda-cupti-cu12
Found existing installation: nvidia-cuda-cupti-cu12 12.5.82
Uninstalling nvidia-cuda-cupti-cu12-12.5.82:
Successfully uninstalled nvidia-cuda-cupti-cu12-12.5.82
Attempting uninstall: nvidia-cublas-cu12
Found existing installation: nvidia-cublas-cu12 12.5.3.2
Uninstalling nvidia-cublas-cu12-12.5.3.2:
Successfully uninstalled nvidia-cublas-cu12-12.5.3.2
Attempting uninstall: numpy
Found existing installation: numpy 2.0.2
Uninstalling numpy-2.0.2:
Successfully uninstalled numpy-2.0.2
Attempting uninstall: nvidia-cuspars-cu12
Found existing installation: nvidia-cuspars-cu12 12.5.1.3
Uninstalling nvidia-cuspars-cu12-12.5.1.3:
Successfully uninstalled nvidia-cuspars-cu12-12.5.1.3
Attempting uninstall: nvidia-cudnn-cu12
Found existing installation: nvidia-cudnn-cu12 9.3.0.75
Uninstalling nvidia-cudnn-cu12-9.3.0.75:
Successfully uninstalled nvidia-cudnn-cu12-9.3.0.75
Attempting uninstall: nvidia-cusolver-cu12
Found existing installation: nvidia-cusolver-cu12 11.6.3.83
Uninstalling nvidia-cusolver-cu12-11.6.3.83:
Successfully uninstalled nvidia-cusolver-cu12-11.6.3.83
Successfully installed bioc-2.1 boto3-1.37.31 botocore-1.37.31 conllu-4.5.3 docopt-0.6.2 flair-0.15.1 ftfy-6.3.1 intervaltree-3.1.0
WARNING: The following packages were previously imported in this runtime:
[nvidia]
You must restart the runtime in order to use newly installed versions.
```

[RESTART SESSION](#)

Start coding or [generate](#) with AI.