

**PG10:** Build a chatbot for the Indian Penal Code. We'll start by downloading the official Indian Penal Code document, and then we'll create a chatbot that can interact with it. Users will be able to ask questions about the Indian Penal Code and have a conversation with it.

Soln:

```
!pip install gradio
```

```
!pip install faiss-cpu
```

```
!pip install pypdf
```

```
from langchain.text_splitter import RecursiveCharacterTextSplitter,
SentenceTransformersTokenTextSplitter # Import text splitters from
langchain

import numpy as np # Import NumPy for numerical operations

from pypdf import PdfReader # Import PdfReader to read PDF files

from tqdm import tqdm # Import tqdm for progress bar visualization

def word_wrap(string, n_chars=72):
    """
    Wraps a long string to a specified number of characters per line.

    Args:
        string (str): The string to wrap.
        n_chars (int, optional): The maximum number of characters per
        line. Defaults to 72.

    Returns:
        str: The word-wrapped string.
    """
    if len(string) < n_chars:
        return string # Return the string directly if it's shorter
        than the character limit
    else:
        # Find the last space before the character limit and insert a
        newline
        return string[:n_chars].rsplit(' ', 1)[0] + '\n' + \
            word_wrap(string[len(string[:n_chars].rsplit(' ', 1)[0])
            + 1:], n_chars)

from pypdf import PdfReader # Import PdfReader from the pypdf library

reader =
PdfReader("/content/202406281710564823BNS_IPC_Comparative.pdf") #
Create a PdfReader object to read the PDF file "BNS (IPC).pdf"
```

```
pdf_texts = [p.extract_text().strip() for p in reader.pages] # Extract
text from each page of the PDF, strip whitespace, and store in a list

# Filter out empty strings from the list of extracted texts
pdf_texts = [text for text in pdf_texts if text]

print(word_wrap(pdf_texts[0])) # Print the word-wrapped version of the
first text element extracted from the PDF
```

## Output:

Corresponding Section Table Of Bharatiya Nyaya Sanhita 2023, (BNS)

New Addition	Change	Deletedp
Bharatiya Nyaya Sanhita, 2023 (BNS) Indian Penal Code, 1860 (IPC) CHAPTER I - PRELIMINARY CHAPTER I - INTRODUCTION 1. Short title, commencement and application. 1(1)		
1. Title and extent of operation of the Code. 1(2) New Sub-Section		
1(3) 2. Punishment of offences committed within India. 1(4) 3. Punishment of offences committed beyond, but which by law may be tried within, India. 1(5) 4. Extension of Code to extra-territorial offences. 1(6) 5. Certain laws not to be affected by this Act. 2. Definitions. (Change) 2(1) 'act' 33. "Act". "Omission" 2(2) 'animal' 47. "Animal". 2(3) 'child' New Sub-Section 2(4) 'counterfeit' 28. "Counterfeit". 2(5) 'Court' 20. "Court of Justice". 2(6) 'death' 46. "Death". 2(7) 'dishonestly' 24. "Dishonestly". 2(8) 'document' (Change) 29. "Document". Deleted 29A. "Electronic record". 2(9) 'fraudulently' 25. "Fraudulently" 2(10) 'gender' (Change) 8. Gender.  2(11) 'good faith' 52. "Good faith" 2(12) 'Government' 17.		

"Government".  
 Deleted 18. "India".  
 2(13) 'harbour' 52A. "Harbour".

2(14) 'injury' 44. "Injury".  
 2(15) 'illegal' and "legally bound to do". 43. "Illegal". "Legally bound to do".  
 2(16) 'Judge' 19. "Judge".

2(17) 'life' 45. "Life".  
 2(18) 'local law' 42. "Local law".  
 2(19)  
 'man' 10. "Man". "Woman".  
 2(20) 'month' and 'year' 49. "Year".  
 "Month".  
 2(21) 'movable property' (Change) 22. "Movable property"

2(22) 'number' 9. Number.  
 2(23) 'oath' 51. "Oath".  
 2(24) 'offence'  
 40. "Offence".  
 2(25) 'omission' 33. "Act". "Omission"  
 2(26) 'person'  
 11. "Person".  
 2(27) 'public' 12. "Public".  
 Deleted 14- "Servant of  
 Government".  
 2(28) 'public servant' 21. "Public servant".  
 2(29)  
 'reason to believe' 26. "Reason to believe"  
 Deleted 50. "Section".

2(30) 'special law' 41. "Special law".

```
# [5]: from langchain.text_splitter import
RecursiveCharacterTextSplitter, SentenceTransformersTokenTextSplitter #
Import text splitters from langchain

character_splitter = RecursiveCharacterTextSplitter( # Initialize
RecursiveCharacterTextSplitter
    separators=["\n\n", "\n", ". ", " ", ""], # Define separators to
split text by priority (double newline, newline, sentence end, space,
character)
    chunk_size=1000, # Define the maximum chunk size in characters
    chunk_overlap=20 # Define the overlap between adjacent chunks in
characters
)

character_split_texts =
character_splitter.split_text('\n\n'.join(pdf_texts)) # Split the PDF
texts into chunks using the defined character splitter, joining the pdf
texts with double newlines first
```

```
print(word_wrap(character_split_texts[10])) # Print the word-wrapped
version of the 11th chunk (index 10)
print(f"\nTotal chunks: {len(character_split_texts)}") # Print the
total number of chunks created
```

### Output :

```
other than death.
104. When such right extends to causing any harm

other than death.
43. Commencement and continuance of right of

private defence of property.
105. Commencement and continuance of the
right of
private defence of property.
44. Right of private defence
against deadly assault
when there is risk of harm to innocent person.

106. Right of private defence against deadly assault
when there is
risk of harm to innocent person.
CHAPTER IV
OF ABETMENT, CRIMINAL
CONSPIRACY AND
ATTEMPT
Of abetment
CHAPTER V
OF ABETMENT
45.
Abetment of a thing. 107. Abetment of a thing.
46. Abettor. 108.
Abettor.
47. Abetment in India of offences outside India. 108A.
Abetment in India of offences outside India.
48. Abetment outside
India for offence in India. New Section
49. Punishment of abetment if
act abetted is
committed in consequence and where no express

provision is made for its punishment.
109. Punishment of abetment if
the act abetted is

Total chunks: 76
```

```
!pip install langchain-community
```

```
from getpass import getpass # Import getpass for secure password input

#from Langchain import HuggingFaceHub # commented out line, likely an
old import statement
```

```

from langchain_community.llms import HuggingFaceHub # Import
HuggingFaceHub from langchain_community for language models
import os # Import os module for environment variables

inference_api_key = getpass() # Prompt user to enter their Hugging Face
API key securely
#place your huggingface API key after running this cell
os.environ["HUGGINGFACEHUB_API_TOKEN"] = inference_api_key # Set the
Hugging Face API key as an environment variable

inference_api_key # Display the API key (for debugging or confirmation,
but generally not recommended to print API keys)

from langchain_community.embeddings import
HuggingFaceInferenceAPIEmbeddings # Import
HuggingFaceInferenceAPIEmbeddings for embeddings

embedding_function = HuggingFaceInferenceAPIEmbeddings( # Initialize
HuggingFaceInferenceAPIEmbeddings
                                api_key=inference_api_key, # Pass the API
key for authentication
                                model_name="sentence-transformers/all-
MiniLM-l6-v2" # Specify the model to use for embeddings (all-MiniLM-l6-
v2)
)

from langchain_community.vectorstores import FAISS # Import FAISS for
vector storage
db = FAISS.from_texts(character_split_texts, embedding_function) #
Create a FAISS vector database from the split texts and embedding
function

print(db.index.ntotal) # Print the total number of vectors in the FAISS
index

query = "What does BNS Section 72 talks about ?" # Define the query
string to search for in the vector database

retrieved_documents = db.similarity_search(query) # Perform a
similarity search in the vector database 'db' using the defined query
                                # and store the
retrieved documents in the 'retrieved_documents' variable

retrieved_documents

```

Output:

[Document(id='4a103413-5d76-4a97-962c-3acbd19420ab', metadata={}, page\_content='Bharatiya Nyaya Sanhita, \n2023 (BNS) \nIndian Penal Code, \n1860 (IPC) \n341 (4) New Sub-Section \n342. Counterfeiting device or mark used for \nauthenticating documents described in section 338, \nor possessing counterfeit marked material. \n342(1) \n475. Counterfeiting device or mark used for \nauthenticating documents described in section 467, \nor possessing counterfeit marked material. \n342(2) 476. Counterfeiting device or mark used for \nauthenticating documents other than those \ndescribed in section 467, or possessing counterfeit \nmarked material. \n343. Fraudulent cancellation, destruction, etc., of \nwill, authority to adopt, or valuable security. \n477. Fraudulent cancellation, destruction, etc., of \nwill, authority to adopt, or valuable security. \n344. Falsification of accounts. 477A. Falsification of accounts. \nOf property marks Of Property and Other Marks \n345. Property mark. \n345 (1) \n479. Property mark. \n345 (2) 481. Using a false property mark.'],

Document(id='ab84c414-3953-4acf-9836-83999e22f6d8', metadata={}, page\_content='Bharatiya Nyaya Sanhita, \n2023 (BNS) \nIndian Penal Code, \n1860 (IPC) \n36. Right of private defence against act of a person \nof unsound mind, etc. \n98. Right of private defence against the act of a \nperson of unsound mind, etc. \n37. Acts against which there is no right of private \ndefence. \n99. Acts against which there is no right of private \ndefence. \n38. When right of private defence of body extends \nto causing death. \n100. When the right of private defence of the body \nextends to causing death. \n39. When such right extends to causing any harm \nother than death. \n101. When such right extends to causing any harm \nother than death. \n40. Commencement and continuance of right of \nprivate defence of body. \n102. Commencement and continuance of the right of \nprivate defence of the body. \n41. When right of private defence of property \nextends to causing death. \n103. When the right of private defence of property \nextends to causing death. \n42. When such right extends to causing any harm'),

Document(id='cbb8de09-9066-4811-b2cd-70d16c72ce6b', metadata={}, page\_content='other than death. \n104. When such right extends to causing any harm \nother than death. \n43. Commencement and continuance of right of \nprivate defence of property. \n105. Commencement and continuance of the right of \nprivate defence of property. \n44. Right of private defence against deadly assault \nwhen there is risk of harm to innocent person. \n106. Right of private defence against deadly assault \nwhen there is risk of harm to innocent person. \nCHAPTER IV \nOF ABETMENT, CRIMINAL CONSPIRACY AND \nATTEMPT \nOf abetment \nCHAPTER V \nOF ABETMENT \n45. Abetment of a thing. 107. Abetment of a thing. \n46. Abettor. 108. Abettor. \n47. Abetment in India of offences outside India. 108A. Abetment in India of offences outside India. \n48. Abetment outside India for offence in India. New Section \n49. Punishment of abetment if act abetted is \ncommitted in consequence and where no express \nprovision is made for its punishment. \n109. Punishment of abetment if the act abetted is'),

Document(id='5efd3561-80d2-4010-babb-808f6cbee0b7', metadata={}, page\_content='146. Unlawful compulsory labour. 374. Unlawful compulsory labour. \nCHAPTER VII \nOF OFFENCES AGAINST THE STATE \nCHAPTER VI \nOF OFFENCES AGAINST THE STATE \n147. Waging, or attempting to wage war, or \nabetting waging of war, against Government of \nIndia. \n121. Waging, or attempting to wage war, or abetting \nwaging of war, against the Government of India. \n148. Conspiracy to commit offences punishable by \nsection 147. \n121A. Conspiracy to commit offences punishable by \nsection 121. \n149. Collecting arms, etc., with intention of waging \nwar against Government of India. \n122. Collecting arms, etc., with intention of waging \nwar against the Government of India. \n150. Concealing with intent to facilitate design to \nwage war. \n123. Concealing with intent to facilitate design to \nwage war. \n151. Assaulting President, Governor, etc., with \nintent to compel or restrain exercise of any lawful \npower. \n124. Assaulting President, Governor, etc., with intent')]

```
!pip install gradio
```

```
!pip install cohere
```

```
# Bharathiya Nyaya Sanhita - IPC Chatbot

import cohere # Import the Cohere library for language model
interaction
import gradio as gr # Import Gradio for creating a user interface
```

```

from langchain_community.vectorstores import FAISS # Import FAISS for
vector storage

# Initialize the Cohere client
co = cohere.Client('eA50e27b8807ycXim4jLv5BxMJurbufz9e1AMJNz') #
Replace 'YOUR API' with your actual Cohere API key

# Initialize the FAISS vector store
db = FAISS.from_texts(character_split_texts, embedding_function) #
Create a FAISS index from the text chunks and embedding function

print("Total indexed documents in FAISS:", db.index.ntotal) # Print the
number of documents indexed in the FAISS vector store

```

### Output:

Total indexed documents in FAISS: 76

```

def rag(query, retrieved_documents, model="command"):
    """
    Performs Retrieval-Augmented Generation (RAG) to answer a query
    based on retrieved documents using Cohere's chat model.

    Args:
        query (str): The user's question or query.
        retrieved_documents (list): A list of documents retrieved from
a vector database that are relevant to the query.
        model (str, optional): The Cohere chat model to use. Defaults
to "command".

    Returns:
        str: The generated answer from the Cohere chat model.
    """
    # Extract the page content from each retrieved document and join
them into a single string with double newlines as separators.
    information = "\n\n".join([docs.page_content for docs in
retrieved_documents])

    # Define the messages to be sent to the Cohere chat model.
    # This includes a system message to set the context and a user
message with the query and retrieved information.
    messages = [
        {
            "role": "system",
            "content": """You are a helpful expert in Bharatiya Nyay
Sanhita (BNS).
Your users are asking questions about information contained in
Bharatiya Nyay Sanhita document.

```

You will be shown the user's question, and the relevant information from given document.

Note that if asked for section get BNS section number.

Answer the user's question using only this information. """ # System message to guide the model's behavior as a BNS expert.

```
    },
    {
        "role": "user",
        "content": f"Question: {query}. \n Information:
{information}" # User message containing the user's query and the
retrieved information.
    }
]

# Call the Cohere chat API to get a response based on the provided
messages.
response = co.chat( # Using the 'co' Cohere client (assumed to be
initialized elsewhere)
    model=model, # Specify the model to use
    message=query, # Pass the user's query as the main message
    documents=messages # Pass the list of messages including system
and user prompts
)

return response.text # Return the text of the generated response
from the Cohere chat model.
```

```
# Define the chatbot function
def chatbot(query):
    """
    Chatbot function to answer user queries based on retrieved
    documents using RAG.

    Args:
        query (str): The user's question or query.

    Returns:
        tuple: A tuple containing the response from the RAG model and
        the source text from retrieved documents.
        Returns an error message and empty source text if an
        exception occurs.
    """
    try:
        # Query FAISS to get retrieved documents
        retrieved_documents = db.similarity_search(query, k=5) #
        Perform similarity search in FAISS database 'db' using the query and
        retrieve top 5 documents
```



```

        # Debug: print retrieved documents
        # print("Retrieved Documents:", retrieved_documents) #
        Commented out debug print statement

        # Call the RAG function
        response = rag(query, retrieved_documents) # Call the rag
        function (defined previously) to generate a response using the query
        and retrieved documents

        source_text = "\n\n".join([doc.page_content for doc in
        retrieved_documents]) # Combine the page content of retrieved documents
        into a single string separated by double newlines
        return response, source_text # Return the generated response
        and the combined source text

    except Exception as e: # Catch any exceptions that might occur
    during the process
        # Debug: print exception details
        print("Error:", e) # Print the error message to the console

        return str(e), "" # Return the error message as a string and an
        empty string for source text in case of error

```

```

# Set up the Gradio interface
iface = gr.Interface( # Create a Gradio Interface object

    fn=chatbot, # Pass the user query to the chatbot function.
    'chatbot' is assumed to be a function defined elsewhere in the code.
    inputs=gr.Textbox(lines=2, placeholder="Ask a Bharatiya Nyay
    Sanhita (BNS /IPC) question..."), # Define the input component as a
    textbox with 2 lines and a placeholder text.

    outputs=[ # Define the output components as a list
        gr.Textbox(label="Response", lines=4), # First output is a
        textbox labeled "Response" with 4 lines.
        gr.Textbox(label="Source Text", lines=10) # Second output is a
        textbox labeled "Source Text" with 10 lines.
    ],
    title="Bharatiya Nyay Sanhita", # Set the title of the Gradio
    interface.
    description="Ask any Bharathiya Nyay Sanhita related question, and
    I will provide answers based on the relevant information." # Set the
    description of the Gradio interface.
)

# Launch the Gradio interface
iface.launch() # Launch the Gradio interface to start the chatbot
application.

```

Output :

Query

Kidnapping

Response

In the Bharatiya Nyay Sanhita (BNS), kidnapping is defined as below:

- Kidnapping or abducting in order to murder or for ransom etc. (Section 140)
- Kidnapping or abducting in order to subject a person to grievous hurt, slavery, etc. (Section 140(4))
- Importation of a girl or boy from a foreign country (Section 141)
- Wrongfully concealing or keeping in confinement, kidnapped or abducted person (Section 142)
- Trafficking of person (Section 143)
- Exploitation of a trafficked person (Section 144)
- Habitual dealing in slaves (Section 145)

The BNS also outlines punishments for those found guilty of kidnapping.

363A. Kidnapping or maiming a minor for purposes of begging.

140. Kidnapping or abducting in order to murder or for ransom etc.

140(1)

364. Kidnapping or abducting in order to murder.

140(2) 364A. Kidnapping for ransom, etc.

140(3) 365. Kidnapping or abducting with intent secretly and wrongfully to confine person.

140(4) 367. Kidnapping or abducting in order to subject person to grievous hurt, slavery, etc.

141. Importation of girl or boy from foreign country. (Change)

366B. Importation of girl from foreign country.

142. Wrongfully concealing or keeping in confinement, kidnapped or abducted person.

368. Wrongfully concealing or keeping in confinement, kidnapped or abducted person.

143. Trafficking of person. (Change) 370. Trafficking of person.

144. Exploitation of a trafficked person. (Change) 370A. Exploitation of a trafficked person

145. Habitual dealing in slaves. 371. Habitual dealing in slaves.

Bharatiya Nyaya Sanhita,

2023 (BNS)

Indian Penal Code,

1860 (IPC)

provocation. provocation.

134. Assault or criminal force in attempt to comm it

theft of property carried by a person.  
356. Assault or criminal force in attempt to commit theft of property carried by a person.  
135. Assault or criminal force in attempt to wrongfully to confine a person. (Change)  
357. Assault or criminal force in attempt wrongfully to confine a person.  
136. Assault or criminal force on grave provocation. (Change)  
358. Assault or criminal force on grave provocation.  
Of kidnapping, abduction, slavery and forced labour  
Of Kidnapping, Abduction, Slavery and Forced Labour  
137. Kidnapping.  
137(1)  
359. Kidnapping.  
137(1)(a) 360. Kidnapping from India.  
137(1)(b) 361. Kidnapping from lawful guardianship.  
137(2) 363. Punishment for kidnapping.  
138. Abduction. 362. Abduction.  
139. Kidnapping or maiming a child for purposes of begging. (Change)

Bharatiya Nyaya Sanhita,  
2023 (BNS)  
Indian Penal Code,  
1860 (IPC)  
303 (1)  
303 (2) (Change) 379. Punishment for theft.  
304. Snatching. New Section  
305. Theft in a dwelling house, or means of transportation or place of worship, etc. (Change)  
380. Theft in dwelling house, etc.  
306. Theft by clerk or servant of property in possession of master.  
381. Theft by clerk or servant of property in possession of master.  
307. Theft after preparation made for causing death, hurt or restraint in order to committing of theft.  
382. Theft after preparation made for causing death, hurt or restraint in order to the committing of the theft.  
Of extortion Of Extortion  
308. Extortion.  
308 (1)  
383. Extortion.  
308 (2) 384. Punishment for extortion.  
308 (3) 385. Putting person in fear of injury in order to

commit extortion.

308 (4) 387. Putting person in fear of death or of grievous hurt, in order to commit extortion.

308 (5) 386. Extortion by putting a person in fear of death or

398. Attempt to commit robbery or dacoity when armed with deadly weapon.

313. Punishment for belonging to gang of robbers, dacoits, etc.

401. Punishment for belonging to gang of thieves.

Of criminal misappropriation of property Of Criminal Misappropriation of Property

314. Dishonest misappropriation of property.

(Change)

403. Dishonest misappropriation of property.

315. Dishonest misappropriation of property possessed by deceased person at the time of his death.

404. Dishonest misappropriation of property possessed by deceased person at the time of his death.

Of criminal breach of trust Of Criminal Breach of Trust

others. (Change)

336. Act endangering life or personal safety of others.

125(a) 337. Causing hurt by act endangering life or personal safety of others.

125(b) 338. Causing grievous hurt by act endangering life or personal safety of others.

Of wrongful restraint and wrongful confinement Of wrongful restraint and wrongful confinement

126. Wrongful restraint. (Change)

126(1)

339. Wrongful restraint.

126(2) 341. Punishment for wrongful restraint.

127. Wrongful confinement.

127(1)

340. Wrongful confinement.

127(2) 342. Punishment for wrongful confinement.

127(3) 343. Wrongful confinement for three or more days.

127(4) 344. Wrongful confinement for ten or more days.

127(5) 345. Wrongful confinement of person for whose liberation writ has been issued.

127(6) 346. Wrongful confinement in secret.

127(7) 347. Wrongful confinement to extort property, or constrain to illegal act.

127(8) 348. Wrongful confinement to extort confession, or compel restoration of property.