

Supplementary File 1: PubMed Data Retrieval Script

Overview: The following Python script (utilizing the Biopython library) was developed and executed to automatically retrieve and download clinical case abstracts from the PubMed database. The script executes the precise Boolean search strategy defined in the methodology and extracts the PMID, Title, and Abstract text for downstream data cleaning and Large Language Model (LLM) processing. Fault tolerance (breakpoint continuation) and polite scraping delays are incorporated to ensure reliable and compliant data retrieval.

```
from Bio import Entrez
import pandas as pd
from tqdm import tqdm
import time
import os

# ===== Configuration =====
Entrez.email = "your_email@example.com" # Please change to
your email address

# Broad search query: Covers all OB/GYN fields + Case Reports
SEARCH_QUERY = (
    '("Gynecology"[MeSH] OR "Obstetrics"[MeSH] OR
    "Gynecologic Neoplasms"[MeSH] '
    'OR "Reproductive Medicine"[MeSH] OR "Infertility"[MeSH])
    'AND "Case Reports"[PT]'
)

TOTAL_COUNT = 5000 # Target number of records to fetch
BATCH_SIZE = 50 # Number of records to process per batch
OUTPUT_FILE = "gyn_full_cases.csv"
# =====

def get_pmid_list():
    print(f"Searching PubMed for keywords: {SEARCH_QUERY}")
    handle = Entrez.esearch(db="pubmed", term=SEARCH_QUERY,
retmax=TOTAL_COUNT, sort="relevance")
    record = Entrez.read(handle)
    handle.close()
    id_list = record["IdList"]
    print(f"Search complete! Matched {len(id_list)} eligible
cases.")
    return id_list
```

```

def fetch_details(id_list):
    # If the file exists, read fetched PMIDs to resume from
    breakpoint (fault tolerance)
    if os.path.exists(OUTPUT_FILE):
        existing_df = pd.read_csv(OUTPUT_FILE)
        done_pmids =
set(existing_df['PMID'].astype(str).tolist())
        id_list = [i for i in id_list if i not in done_pmids]
        print(f"Breakpoint detected. Skipping completed
records. {len(id_list)} records remaining to download.")

if __name__ == "__main__":
    ids = get_pmid_list()
    if ids:
        fetch_details(ids)
    else:
        print("No results found. Please check your network
connection or search query.")

```

Supplementary File 2: Large Language Model System Prompt

System Prompt Overview: To ensure the standardized extraction of pedagogical features from unstructured clinical case abstracts, the Qwen3 Large Language Model was configured with the following system prompt. The model was instructed to act as a senior medical educator and extract four core components: Primary Diagnosis, Teaching Core Points, Clinical Pitfalls, and Difficulty Level.

Exact Prompt Text Used for Extraction:

Role: You are a highly experienced clinical educator and fellowship director in Obstetrics, Gynecology (OB/GYN), and Reproductive Medicine. Your task is to carefully read the following published medical case abstract and extract structured pedagogical information to build a Case-Based Learning (CBL) database for senior residency training.

Instructions: For the provided abstract, please extract and output the following four components strictly in clear, concise English:

Diagnostic Accuracy (Primary Diagnosis): Identify the primary medical diagnosis, including any critical comorbidities directly mentioned in the text.

Teaching Core Points: Extract 2 to 3 essential knowledge targets required for residency training based on this specific case (e.g., specific differential diagnoses, surgical indications, or pathological features).

Clinical Pitfalls (Tips & Blind Spots): Identify 1 to 2 crucial warnings, common "blind spots," or cognitive biases that junior doctors might face in similar real-world scenarios (e.g., risks of misdiagnosis, improper infection control, or lack of individualized treatment). If not explicitly stated in the text, logically infer the most likely clinical pitfall based on standard medical guidelines for this condition.

Difficulty Level: Estimate the cognitive load required to manage this case. Output ONLY ONE of the following labels:

Easy: Typical presentation of common diseases.

Medium: Requires multi-step reasoning or handling of minor complications.

Hard: Involves rare diseases, complex multidisciplinary emergencies, or atypical presentations.