Authors: Justin Lewman, Timothy Obiso, Ben Soli, Anatasiia Tatlubaeva

Project notes:

The use of this project requires an API key for OpenAI. Ideally, if you do not have an openAI account, creating one will give you more than enough credits to run the program. Here is a link to a short tutorial of how to obtain one if needed:
https://www.howtogeek.com/885918/how-to-get-an-openai-api-key/
There will be an empty file in the submission folder entitled: “open_api_key.txt,” simply copy the key into the file, download all the required files from requirements.txt using `“pip install -r requirements.txt”` then follow the steps in scripts.sh.

This includes running elastic search and linking to the embedding server as background processes just as in HW5.
`"./bin/elasticsearch"*` and `“python -m embedding_service.server --embedding sbert  --model all-mpnet-base-v2”` in two separate terminals
(LEAVE THESE RUNNING UNTIL YOU ARE DONE USING Yoga-MAIT)
*note in order to start elastic search it must be downloaded by the below dependency and navigated to in the terminal.

Once these are done create the index by running `“python load_index.py --index_name poses --poses_folder_path data”` to create the pose index in a third terminal. This will take around 5 minutes. Once that’s complete, run the program by starting `pythonapp.py` wait for it to start and go to localhost:5000 to use Yoga MAIT!

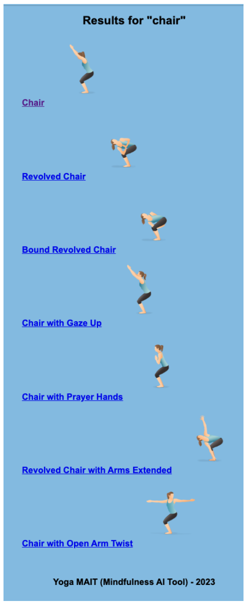
Additional dependencies:
The elastic search and use the exact same version as in HW5:
https://www.elastic.co/downloads/past-releases/elasticsearch-7-10-2

(If you have any questions or difficulties with the API key feel free to email jlewman@brandeis.edu and I can help and/or share my key temporarily for grading!)

The code contained in the “corpus_creation” folder is what was used to create the corpus found in “data.” The code does not need to be run but can be if there is an issue with the data. It will create a new instance of yoga_pose_data.json which can be put into data and will produce a folder called images which will contain all the images. (Some code was removed for simplicity in repurposing it but the majority is there for grading or examining.)

Supplementary material:

Written example of demo with test queries and explanations:



Results for "chair"

Chair

Revolved Chair

Bound Revolved Chair

Chair with Gaze Up

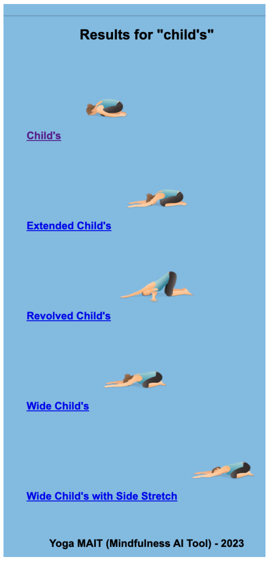
Chair with Prayer Hands

Revolved Chair with Arms Extended

Chair with Open Arm Twist

Yoga MAIT (Mindfulness AI Tool) - 2023

Using the query "Chair" we can test the keyword matching and classifier detection of a pose name. We can see this example correctly identifies it as a name and includes all poses with "chair" in the title. This is a common and well known pose so it's important that these are accurate.



Results for "child's"

Child's

Extended Child's

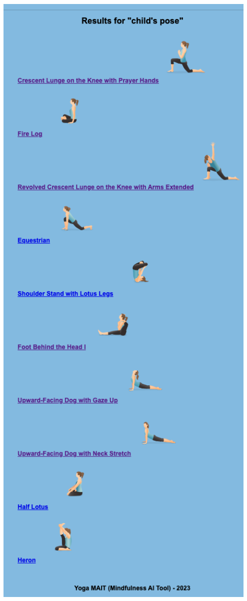
Revolved Child's

Wide Child's

Wide Child's with Side Stretch

Yoga MAIT (Mindfulness AI Tool) - 2023

Another example of name matching is "child's." This is also a well known beginner pose and we can see that when we search for child's it and its associated poses show up.



Results for "child's pose"

Crescent Lunge on the Knee with Prayer Hands

Fire Log

Revolved Crescent Lunge on the Knee with Arms Extended

Equestrian

Shoulder Stand with Lotus Legs

Foot Behind the Head I

Upward-Facing Dog with Gaze Up

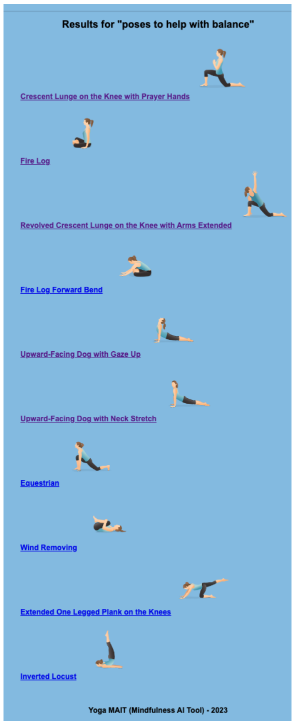
Upward-Facing Dog with Neck Stretch

Half Lotus

Heron

Yoga MAIT (Mindfulness AI Tool) - 2023

Unfortunately an issue with the name matching strategy shows up when we type in "child's pose." Because the poses never contain "pose" in their title and we use a search with embeddings created by the description, benefits, and difficulty this search doesn't find any related poses and instead mainly gives us poses with really short descriptions (thus a higher base tf-idf score.) This is a very specific example so it wasn't our main priority to fix, but a solution may be including the title in the pose embeddings. Additionally, we could run the classification without the word "pose" as this generally isn't too helpful to a search anyway as everything is a pose.



Results for "poses to help with balance"

Crescent Lunge on the Knee with Prayer Hands

Fire Log

Revolved Crescent Lunge on the Knee with Arms Extended

Fire Log Forward Bend

Upward-Facing Dog with Gaze Up

Upward-Facing Dog with Neck Stretch

Equestrian

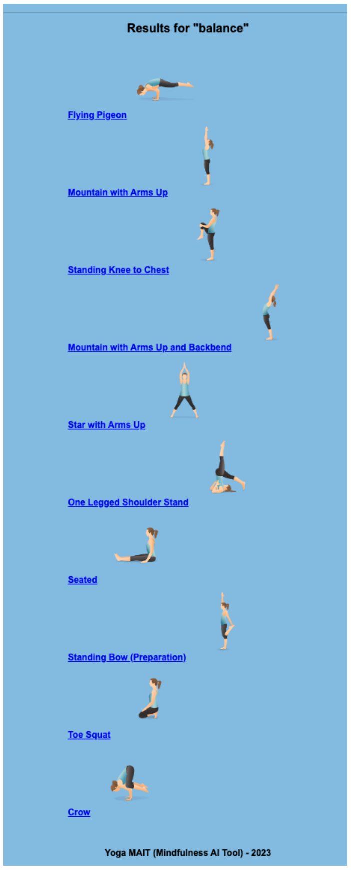
Wind Removing

Extended One Legged Plank on the Knees

Inverted Locust

Yoga MAIT (Mindfulness AI Tool) - 2023

One challenge with our current model is it can often be inaccurate when referring to concepts such as "balance" as the benefits section focuses primarily on muscles or parts of the body being stretched. For example, when searching "poses to help with balance" there are a few great results "crescent lunge" and "extended one-legged plank" but there are also a lot of options focused on the areas of your body that do help with balance (like your core) but not with balance itself. These include poses like "fire log."



Results for "balance"

Flying Pigeon

Mountain with Arms Up

Standing Knee to Chest

Mountain with Arms Up and Backbend

Star with Arms Up

One Legged Shoulder Stand

Seated

Standing Bow (Preparation)

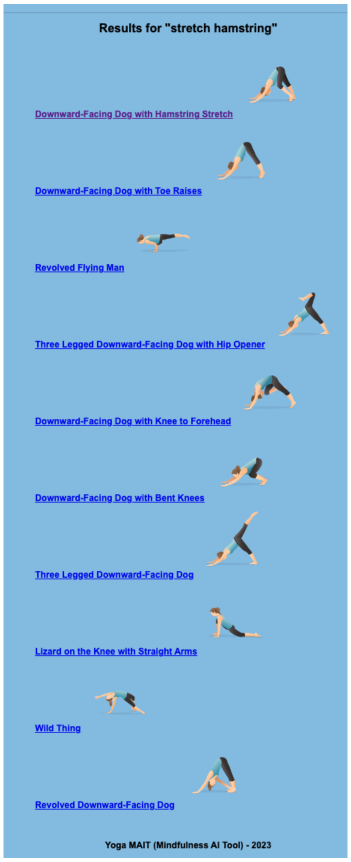
Toe Squat

Crow

Yoga MAIT (Mindfulness AI Tool) - 2023

Additionally, despite using ChatGPT our search engine is still much more accurate with short inhuman queries like: “Balance.” As you can see on the left, using a singular word gave us much more relevant results. These poses all focus heavily on leaning and balancing which are more beneficial for helping balance than just strengthening your core.

One area our model is very good at is identifying poses which stretch certain body parts. For example, searching “Stretch Hamstring” gives a lot of good hamstring (and leg) poses.



Results for "stretch hamstring"

Downward-Facing Dog with Hamstring Stretch

Downward-Facing Dog with Toe Raises

Revolved Flying Man

Three Legged Downward-Facing Dog with Hip Opener

Downward-Facing Dog with Knee to Forehead

Downward-Facing Dog with Bent Knees

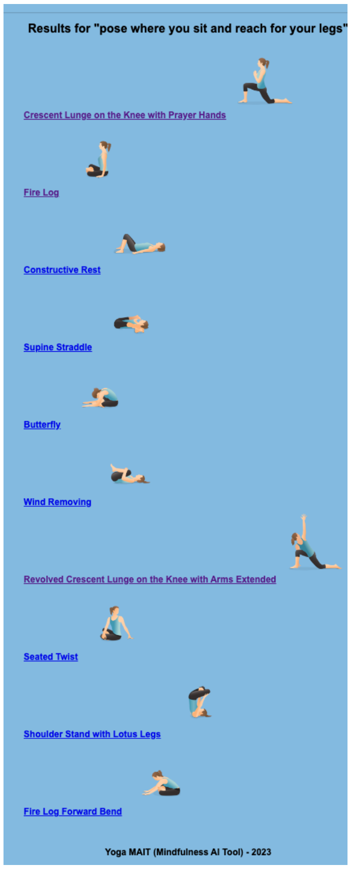
Three Legged Downward-Facing Dog

Lizard on the Knee with Straight Arms

Wild Thing

Revolved Downward-Facing Dog

Yoga MAIT (Mindfulness AI Tool) - 2023



Results for "pose where you sit and reach for your legs"

Crescent Lunge on the Knee with Prayer Hands

Fire Log

Constructive Rest

Supine Straddle

Butterfly

Wind Removing

Revolved Crescent Lunge on the Knee with Arms Extended

Seated Twist

Shoulder Stand with Lotus Legs

Fire Log Forward Bend

Yoga MAIT (Mindfulness AI Tool) - 2023

Finally, if the user already has a pose in mind, the embeddings do a great job helping a person find that pose; although a longer query often results in less accurate poses as stated earlier. For example, searching “pose where you sit and reach for your legs” is a simple description of “fire log forward bed.” We can see that the pose does appear in the front page of results which is good! Unfortunately it's also at the end of the page and a few unrelated poses can be seen too. These are likely a consequence of the embeddings (they have short descriptions and lots of keywords like legs and reach) but don’t quite fit the information request.

Overall the model provided satisfactory results a large majority of the time. There were certainly some outliers like “child’s pose” and optimizing for longer queries would be ideal, but searching for a specific pose, searching by body part, and searching by name have good results. With more time in the future we would have liked to return full routines as results, but that functionality still somewhat exists by clicking through the transition pages available for most poses.