Training Program Recommender System

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***Abstract*—This study introduces a novel Training Program Recommender System (TPRS), designed to optimize fitness routines by using Information Retrieval techniques.The TPRS considers user's choice of muscles and equipment available to workout with consideration of bio parameters. It also considers the user's past activity and improves the results based on continuous feedback. The implementation of this recommender system could significantly impact personalized fitness planning with nutrition plans, fostering a more scientific approach to physical training.**

***Index Terms*—Sequential Model, TensorFlow, Keras, TF-IDF, Cosine Similarity, MultiLabel Binarization, Workout Optimization, Binary Cross Entropy.**

I. Introduction and Motivation

In our commitment to holistic fitness, the Training Program Recommender System integrates personalized nutrition guidance with its workout recommendations. This dual-focused approach combines cutting-edge technology with health science, ensuring that users not only receive custom exercise plans but also tailored dietary suggestions that complement their fitness objectives. The system adeptly interprets nutritional data, translating it into actionable insights that propel users towards their goals. The motivation for the Training Program Recommender System stems from a desire to overcome the limitations of one-size-fits-all fitness solutions by providing personalized workout and nutrition plans tailored to individual health goals, fitness levels, and lifestyle preferences. Utilizing advanced machine learning and natural language processing, the system dynamically adapts to real-time user feedback, ensuring recommendations remain relevant and customized. This approach aims to enhance user engagement and satisfaction, improve health outcomes, and push the boundaries of what digital health platforms can achieve through technological innovation and scientific insight. The project's goal is not only to meet current fitness needs but also to evolve and scale over time, adapting to new trends and user feedback for continuous improvement.

Identify applicable funding agency here. If none, delete this.

II. Problem Statement

Finding the right training program is a common challenge for many. The market is flooded with generic, one-size-fits-all solutions that fail to consider individual differences in fitness levels, goals, and lifestyle constraints. This mismatch can lead to demotivation, plateauing fitness levels, and in some cases, injury. There is a clear demand for a system that can intelligently analyze a user's profile and deliver a tailored training regimen that evolves with their fitness journey.To overcome this challenge, TPRS has emerged as a promising technology that allows for the retrieval of workout plan to a given query. In this context, the problem formulation involves developing an effective TPRS system for food images that can enable users to get their workout plan with nutrition recommendation and thereby enhance the overall food ordering experience.

III. Novelty

The Training Program Recommender System sets a new standard in personalized fitness by merging an extensive exercise database with detailed user profiles. It considers key bioparameters like age and body composition, lifestyle aspects such as work schedules and available equipment, and personal preferences, including workout types and intensity. Additionally, it aligns exercise recommendations with dietary needs and specific health objectives like weight loss or muscle building. This comprehensive integration ensures that each training program is not only tailored to fit individual physical attributes and daily life but also resonates with personal tastes and supports overall health and fitness goals.

IV. Methodology

This section describes the steps taken to develop our user-based retrieval system for TPRS

A. Data Collection

Wecollected data by scraping images from Google Images, Pinterest, Unsplash and Instagram by using selenium in the Python language, as well as BeautifulSoup and the Unsplash API

B. Units

- Use either SI (MKS) or CGS as primary units. (SI units are encouraged.) English units may be used as secondary units (in parentheses). An exception would be the use of English units as identifiers in trade, such as "3.5-inch disk drive".
- Avoid combining SI and CGS units, such as current in amperes and magnetic field in oersteds. This often leads to confusion because equations do not balance dimensionally. If you must use mixed units, clearly state the units for each quantity that you use in an equation.
- Do not mix complete spellings and abbreviations of units: "Wb/m^2" or "webers per square meter", not "webers/m^2". Spell out units when they appear in text: ". . . a few henries", not ". . . a few H".
- Use a zero before decimal points: "0.25", not ".25". Use "cm^3", not "cc".)

C. Equations

Number equations consecutively. To make your equations more compact, you may use the solidus (/), the exp function, or appropriate exponents. Italicize Roman symbols for quantities and variables, but not Greek symbols. Use a long dash rather than a hyphen for a minus sign. Punctuate equations with commas or periods when they are part of a sentence, as in:

$$a + b = \gamma \tag{1}$$

Be sure that the symbols in your equation have been defined before or immediately following the equation. Use "(1)", not "Eq. (1)" or "equation (1)", except at the beginning of a sentence: "Equation (1) is . . ."

D. LaTeX-Specific Advice

Please use "soft" (e.g., `\eqref{Eq}`) cross references instead of "hard" references (e.g., `(1)`). That will make it possible to combine sections, add equations, or change the order of figures or citations without having to go through the file line by line.

Please don't use the `{eqnarray}` equation environment. Use `{align}` or `{IEEEeqnarray}` instead. The `{eqnarray}` environment leaves unsightly spaces around relation symbols.

Please note that the `{subequations}` environment in LaTeX will increment the main equation counter even when there are no equation numbers displayed. If you forget that, you might write an article in which the equation numbers skip from (17) to (20), causing the copy editors to wonder if you've discovered a new method of counting.

BibTeX does not work by magic. It doesn't get the bibliographic data from thin air but from .bib files. If you use BibTeX to produce a bibliography you must send the .bib files.

LaTeX can't read your mind. If you assign the same label to a subsubsection and a table, you might find that Table I has been cross referenced as Table IV-B3.

LaTeX does not have precognitive abilities. If you put a `\label` command before the command that updates the counter it's supposed to be using, the label will pick up the last counter to be cross referenced instead. In particular, a `\label` command should not go before the caption of a figure or a table.

Do not use `\nonumber` inside the `{array}` environment. It will not stop equation numbers inside `{array}` (there won't be any anyway) and it might stop a wanted equation number in the surrounding equation.

E. Some Common Mistakes

- The word "data" is plural, not singular.
- The subscript for the permeability of vacuum μ_0, and other common scientific constants, is zero with subscript formatting, not a lowercase letter "o".
- In American English, commas, semicolons, periods, question and exclamation marks are located within quotation marks only when a complete thought or name is cited, such as a title or full quotation. When quotation marks are used, instead of a bold or italic typeface, to highlight a word or phrase, punctuation should appear outside of the quotation marks. A parenthetical phrase or statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within the parentheses.)
- A graph within a graph is an "inset", not an "insert". The word alternatively is preferred to the word "alternately" (unless you really mean something that alternates).
- Do not use the word "essentially" to mean "approximately" or "effectively".
- In your paper title, if the words "that uses" can accurately replace the word "using", capitalize the "u"; if not, keep using lower-cased.
- Be aware of the different meanings of the homophones "affect" and "effect", "complement" and "compliment", "discreet" and "discrete", "principal" and "principle".
- Do not confuse "imply" and "infer".
- The prefix "non" is not a word; it should be joined to the word it modifies, usually without a hyphen.
- There is no period after the "et" in the Latin abbreviation "et al.".
- The abbreviation "i.e." means "that is", and the abbreviation "e.g." means "for example".

An excellent style manual for science writers is [7].

F. Authors and Affiliations

The class file is designed for, but not limited to, six authors. A minimum of one author is required for all conference articles. Author names should be listed starting from left to right and then moving down to the next line. This is the author sequence that will be used in future citations and by indexing services. Names should not be listed in columns nor group by affiliation. Please keep your affiliations as succinct as possible (for example, do not differentiate among departments of the same organization).

G. Identify the Headings

Headings, or heads, are organizational devices that guide the reader through your paper. There are two types: component heads and text heads.

Component heads identify the different components of your paper and are not topically subordinate to each other. Examples include Acknowledgments and References and, for these, the correct style to use is “Heading 5”. Use “figure caption” for your Figure captions, and “table head” for your table title. Run-in heads, such as “Abstract”, will require you to apply a style (in this case, italic) in addition to the style provided by the drop down menu to differentiate the head from the text.

Text heads organize the topics on a relational, hierarchical basis. For example, the paper title is the primary text head because all subsequent material relates and elaborates on this one topic. If there are two or more sub-topics, the next level head (uppercase Roman numerals) should be used and, conversely, if there are not at least two sub-topics, then no subheads should be introduced.

H. Figures and Tables

a) Positioning Figures and Tables: Place figures and tables at the top and bottom of columns. Avoid placing them in the middle of columns. Large figures and tables may span across both columns. Figure captions should be below the figures; table heads should appear above the tables. Insert figures and tables after they are cited in the text. Use the abbreviation “Fig. 1”, even at the beginning of a sentence.

TABLE I
TABLE TYPE STYLES

Table Head	**Table Column Head**		
	Table column subhead	***Subhead***	***Subhead***
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[a]Sample of a Table footnote.

Fig. 1. Example of a figure caption.

Figure Labels: Use 8 point Times New Roman for Figure labels. Use words rather than symbols or abbreviations when writing Figure axis labels to avoid confusing the reader. As an example, write the quantity “Magnetization”, or “Magnetization, M”, not just “M”. If including units in the label, present them within parentheses. Do not label axes only with units. In the example, write “Magnetization (A/m)” or “Magnetization {A[m(1)]}”, not just “A/m”. Do not label axes with a ratio of quantities and units. For example, write “Temperature (K)”, not “Temperature/K”.

V. LITERATURE REVIEW

The intersection of technology and health has catalyzed the development of various digital interventions aimed at promoting physical fitness. However, an examination of existing literature reveals a recurring shortfall in these technologies: a superficial level of personalization that fails to consider the intricacies of individual health objectives and lifestyle factors (Loellgen et al., 2020; Sushmitha et al., 2022). While platforms such as Nike Training Club, Fitbod, and TrainHeroic offer personalized exercise regimens to an extent, they often do not account for the evolving preferences and feedback of their users, leading to a static and less engaging user experience. Current methodologies in training program recommendation primarily employ content-based and collaborative filtering techniques. While effective in mapping user preferences to content, these methods exhibit limitations in adapting to real-time user feedback, particularly when such feedback is articulated in unstructured formats like natural language (Donciu et al., 2012; Chen et al., 2021). This observation underscores the potential for in- corporating NLP to interpret user feedback dynamically, enabling a recommendation system that evolves in response to user interaction and feedback. The proposed Training Program Recommender System aspires to transcend these limitations by integrating a comprehensive dataset that includes a wide range of exercises, userspecific biometric data, and lifestyle considerations. This integration, coupled with the implementation of NLP for feedback interpretation, positions the system to offer a nuanced, adaptive solution to fitness recommendation. Initial user engagement metrics from a prototype deployment underscore the potential of this approach, indicating a promising avenue for further development and refinement (Dijkhuis et al., 2018). In conclusion, the literature points to a significant need for a more personalized, adaptive approach to fitness technologyone that not only acknowledges but actively incorporates the diverse needs and feedback of its users. The Training Program Recommender System aims to bridge this gap, offering a novel contribution to the field of personalized fitness technology.

ACKNOWLEDGMENT

The preferred spelling of the word “acknowledgment” in America is without an “e” after the “g”. Avoid the stilted expression “one of us (R. B. G.) thanks . . .”. Instead, try “R. B. G. thanks. . .”. Put sponsor acknowledgments in the unnumbered footnote on the first page.

REFERENCES

Please number citations consecutively within brackets [1]. The sentence punctuation follows the bracket [2]. Refer simply to the reference number, as in [3]—do not use “Ref. [3]” or “reference [3]” except at the beginning of a sentence: “Reference [3] was the first . . .”

Number footnotes separately in superscripts. Place the actual footnote at the bottom of the column in which it was cited. Do not put footnotes in the abstract or reference list. Use letters for table footnotes.

Unless there are six authors or more give all authors' names; do not use "et al.". Papers that have not been published, even if they have been submitted for publication, should be cited as "unpublished" [4]. Papers that have been accepted for publication should be cited as "in press" [5]. Capitalize only the first word in a paper title, except for proper nouns and element symbols.

For papers published in translation journals, please give the English citation first, followed by the original foreign-language citation [6].

References

[1] G. Eason, B. Noble, and I. N. Sneddon, "On certain integrals of Lipschitz-Hankel type involving products of Bessel functions," Phil. Trans. Roy. Soc. London, vol. A247, pp. 529–551, April 1955.

[2] J. Clerk Maxwell, A Treatise on Electricity and Magnetism, 3rd ed., vol. 2. Oxford: Clarendon, 1892, pp.68–73.

[3] I. S. Jacobs and C. P. Bean, "Fine particles, thin films and exchange anisotropy," in Magnetism, vol. III, G. T. Rado and H. Suhl, Eds. New York: Academic, 1963, pp. 271–350.

[4] K. Elissa, "Title of paper if known," unpublished.

[5] R. Nicole, "Title of paper with only first word capitalized," J. Name Stand. Abbrev., in press.

[6] Y. Yorozu, M. Hirano, K. Oka, and Y. Tagawa, "Electron spectroscopy studies on magneto-optical media and plastic substrate interface," IEEE Transl. J. Magn. Japan, vol. 2, pp. 740–741, August 1987 [Digests 9th Annual Conf. Magnetics Japan, p. 301, 1982].

[7] M. Young, The Technical Writer's Handbook. Mill Valley, CA: University Science, 1989.