

Departmental Coversheet



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Mini-Project

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LessonLibrary

Section 1: Possible Futures

Suppose LessonLibrary is a browser-based search engine for all kinds of free online lessons and course materials, then I can see four possible futures.

Today, people going into a doctor's office often start with a conversation like, "I searched my symptoms online, and google told me...." However, Michelle Hill, an ECU master's student, suggested, "[it is] tempting to use these tools to find out what may be causing your symptoms... but only 36 percent of the first diagnosis are correct (Edith, 2020)." Making a correct diagnosis requires not only checking symptoms but also taking medical courses. Therefore, when people can find medical classes on LessonLibrary, I can imagine the new opening will be "I believe I got arrhythmia, and I am right because I took a cardiology lesson online. Can you help me to perform a catheter ablation surgery?" The doctor might be upset and spend more time correcting the patient because catheter ablation is not surgery.

When we can obtain college-level courses online, the tuition of large research universities will be cheaper, but that of liberal art colleges will be more expensive. It is not uncommon to see hundreds of students enrolled in one CS class, especially in large public universities like the University of California, Berkeley. However, if students can find resources online, they might consider if the tuition is worthwhile. For the liberal art college, on the other side, professors are destined to concentrate more on their teaching responsibilities and provide more personalized tutoring, which will differentiate them from online courses and therefore be more expensive.

Governments might use LessonLibrary to foster cultural imperialism by implanting ideas that their culture is superior under a lesson and letting citizens of other countries favor one culture over their own. It has been a pervasive phenomenon throughout history. During the early

19th century, Europeans colonized Zimbabwe, and early church groups developed missions to impose European religious and esthetic values on Africans by controlling African education. As a result, many Africans converted to Christianity and abandoned their traditional music in favor of Western music (Von, 1994).

LessonLibrary can not only be used to praise one culture but also be used to defame other cultures if the search results are biased. During the middle era of the Ottoman Empire, “Turkomania” was a rage in Europe; Europeans studied Ottoman clothes, Janissary music, architecture, musical themes, etc. However, as the Ottoman’s economic and political power declined, Victorian literature was dominated by Turks with enormous sex organs (Fleming, 2001). After reading the books or got tutoring, many Europeans started to see the Ottoman Empire as a realm of dreams, where they might live out their sexual or other desires (Fleming, 2001). They forgot the Ottomans brought coffee, tulips, smallpox vaccinations, etc., to Europe. Therefore, if LessonLibrary can recommend biased books/lessons, people might use LessonLibrary to defame other cultures.

Section 2: Ten Stakeholders

There are six direct stakeholders in this project.

1. Patients who are not satisfied with online symptom checkers and want to study the material systematically to check their symptoms and relieve their anxieties.
2. Students who did not understand the course materials and wish to find a lesson that has a detailed explanation.
3. Professors or teachers who do not sure how to give a lecture on some esoteric topics and want to see how other people do this.
4. Full-time employees who wish to dig deeper into their fields but do not have time to take an in-person course in a university.
5. People who are not being employed and wish to learn skills to find a job.
6. People who want to travel to another country and wish to study other culture though a lesson (but took a biased one).

There are four indirect stakeholders.

1. Doctors are indirect stakeholders. They have already faced a lot of patients who took advice from Dr. Google and passed the best time to treat their disease. In the future, they need to correct and argue with patients who misunderstand class materials.
2. College and universities will be indirectly affected. As more students choose for free online courses, tuition rates must be reduced to attract more students.
3. Indirect stakeholders include political parties in “colonized” administrations. This is subtle, but when Europeans occupied Zimbabwe, Zimbabweans were taught that Western culture is modern and civilized, and they forgot their tradition. As a result, the conservative party’s position was jeopardized, and the radical party was welcomed.

4. Tourists are also indirect stakeholders if the locals take biased lessons through LessonLibrary. When people travel and are asked where they are from, the locals will occasionally ask weird and even unpleasant questions to validate things they learned online.

Section 3: Decision Points

The first decision point is should we allow users to search all lessons with no restriction? Will we, for example, enable a patient to study medical science in order to alleviate their anxiety? Or should we allow high school students to learn advanced college material? There are two options to deal with this.

The first option is that LessonLibrary will allow users to browse for any course. Still, they will need to complete an online test or upload their certificate to confirm their comprehensions in specific professional areas. Medical science, for example, is a discipline for which LessonLibrary will require certification. Today, 35% of individuals in the United States utilize online symptom checkers to self-diagnose (Butterfield, 2013), but only 36% of the first diagnosis are correct (Edith, 2020). The issue will only become worse if they use LessonLibrary. Diagnosing needs years of study, four to seven years of being a medical student, and another three years to seven years of residency. It is quite improbable that patients will be able to treat themselves appropriately after only a few classes. Moreover, most of the time, patients are doing it to tempt themselves, and it is more probable that they will become more nervous. Jason Maude (2013), the founder and CEO of Isabel Healthcare, argued that when patient types in headache into an online symptom checker, they will be terrified since a brain tumor will appear. Therefore, making some professional fields like medical science accessible to everyone would threaten both physical and mental health for some people. As a result, when it comes to professional issues, LessonLibrary must determine whether or not the users are qualified to search for the course.

On the contrary, the second option is that LessonLibrary places no restrictions on the search; users are free to search for whatever lesson they choose. In this way, we may be able to assist the vast majority of people. For example, if a student does not comprehend the course

material and wishes to learn more through online courses, the student can simply use LessonLibrary to accomplish so. This can ensure that the student's willingness to learn and explore is assured. People who want to change careers, such as from real estate to computer technology, can look for free online tutorials after a day of work without paying anything or attending a university. It can also assist professors who are unsure how to teach a course in a more accessible manner; the professor can take the online course and see how others teach to enhance their teaching quality.

Adopting the second option, on the other hand, LessonLibrary may be detrimental to schools, particularly public universities. Students currently pay 20,000 dollars a year for a college degree (Powell, 2021). For many families, the expense of education remains a considerable financial burden. Yet, at some large universities, they pay for seats in a lecture hall with little interaction with professors, and most people find office hours ineffective. Michelle Donelan (2022), the Minister of State for Universities of the United Kingdom, suggests that if students are dissatisfied, they are entitled to a "refund" on courses because they are paying a significant amount of money that is an investment in their own lives. Therefore, if students can access free lessons online, tuition rates must be reduced to attract more students.

Among these two options, I would like to choose the second one because when designing a search engine for lessons, the central rule is to ensure users can acquire knowledge, skill, or expertise without bias, learn to respect others and be faithful. It seems undeniable that preventing patients from taking medical classes can release some burdens from doctors or prevent them from taking unprofessional advice. However, it should not be up to LessonLibrary to decide who is qualified to study this lesson; we should let the users make the call. The best LessonLibrary can do is to give warnings if, for example, the lesson the user is looking for contains

inappropriate content that hopes the user to be over a particular age or needs a professional background.

The second decision point is whether or not we need to impose censorship over lessons. When it comes to search engines, one thing we must discuss is how to reduce the bias in the search result? As forementioned, throughout history, people have used lectures, literature, or studies to impose some opinions on students, readers, or researchers. For Europeans, literature about Ottoman Empire was disguised by sex organs, giving them a wrong fantasy that the empire was heaven (Fleming, 2001). The truth, however, is the formation of authoritarian governments and the rise of military power. For the people of Zimbabwe, the early Europe church imposed European values and condemned traditional forms of music culture, which made court musicians become prominent figures in the recent history of Zimbabwe (Von, 1994). There are three options we can take to prevent this from happening on LessonLibrary in the future.

1) The lessons that are malicious or too biased will be removed from the search result. It has been a common tactic during the last few centuries to use literature to spread preconceptions for political and religious benefits. During the European wars of religion, many European writers saw the Ottomans as a source of evil, portraying them as “dreadful,” “ferocious,” and “unspeakable” while also being “sex-crazed,” “harem-driven,” and “debauched.” (Fleming, 2001). In a French play in 1612, Sultan Mehmet the Conqueror, a sophisticated Renaissance prince, was portrayed as a harsh and vicious tyrant. Martin Luther, a German priest, wrote that the Ottomans were “a scourge intentionally sent by God to sin Christians” (Blasco, 2012). All these actions were rooted in Europeans’ desire to define themselves by identifying the virtues they wished to have and attributing the opposite to their enemy (Fleming, 2001). In this context, the enemy was Ottoman Empire, and they preached to their own people that they were the ones

that were “humaneness,” “civilization,” and “true believers” (Fleming, 2001). By reading the literature, Europeans were misguided, and their values of altruism were hurt. In the context of LessonLibrary, the literature will be replaced by the courses, but essentially, they are the same, imposing biased idea over someone through some materials. To stop history from happening again, LessonLibrary should forbid the spread of malicious and biased lessons.

2) The search engine should respect the traditional culture, favoring lessons taught by locals. If one wants to find “Zimbabwe Music,” the search engine will list traditional music on top, whilst today’s Zimbabwe music is an amalgamation of Western and indigenous musical styles (Von, 1994). This option is subtle because it does not correctly reflect the actual history and is solely out of protecting local culture and values of belonging. However, today traditional musical practices have flourished as a result of a revitalized sense of black pride and the resurrection of traditional music institutions. (Von, 1994). Furthermore, when Google doodle, a non-Zimbabwean platform, created an interactive online movie that lets people play the *mbira*, a traditional Zimbabwean instrument, it was attacked for adopting “the false generosity of the colonial legacy” out of financial and marketing advantages (Rafomoyo, 2021). Tawengwa (2020), an eminent Zimbabwean musician, claimed that “...a white man walked in to teach the ‘Music of Africa’ course on *mbira* music...[is] grounded his teaching in the very texts I found lacking.” Therefore, if it is the predominant image that people want to come back to tradition, the search engine should let it be, respect and enhance the values of religion and spiritual beliefs.

3): The search result should consider the diversity of views. For example, suppose one wants to dive into the history of the Ottoman Empire, the search engine should return as many different perspectives as possible and indicate how each lesson relates to or contradicts each other. The search engine should also suggest classes taught in foreign languages because it is not

uncommon to see that more lessons are offered in popular languages such as English than that are taught in minority languages like Polish. However, we should not allow people's voices to be silenced because of their language since they may provide a unique viewpoint based on their cultural heritage.

Among these options, I would prefer the last one because the most important guideline to keep in mind while creating a search engine for courses is that users should be able to gain information, skill, or competence without prejudice and learn to respect others and be faithful. In other words, the search engine should provide as many different results as feasible.

LessonLibrary can most interfere with addressing potential prejudice and giving appropriate warning over controversial topics. LessonLibrary should provide the user the entire image no matter whether it is right or wrong, let the user check different views, and decide which opinion they will believe. Only in this way, LessonLibrary can ensure the largest independency of the users. There are some advantages to the other two options, but they damage people's value of exploring knowledge freely; concealing and filtering results is just another way of being biased.

Section 4: Algorithmic Bias

Defining the target variable:

The target of the LessonLibrary is to recommend “good” courses. However, it comes with a subtlety that what means a “good” course. In the example of Zimbabwean music, Tawengwa found a white man teaching Zimbabwean music lacks foundation (2020), and the online tutorial *mbira* on Google doodle is criticized as a symbol of neocolonialism (Rafomoyo, 2021). In both circumstances, a “good” Zimbabwean music lesson is one that fully appreciates the local culture and should be taught by the locals or someone who is “qualified.” However, today’s Zimbabwe music is a mix of Western and traditional musical styles (Von, 1994). Therefore, defining “good” in terms of tradition alone would be lopsided.

Training data: labeling examples:

When giving the labels to the courses, we might create some biases. For example, to classify “good” courses, LessonLibrary might use labels like “taught by famous professors,” “machine learning at Stanford,” “high hit in your area,” “recommended by influencer Bob,” etc. However, those labels would not be necessary to be ground truth. Professors who are well-known for their research may devote more time to it than their teaching. Stanford's machine learning courses are outstanding, but they are not always appropriate for beginners. The number of hits and influencer referrals should not be used to determine the quality of a course. If LessonLibrary’s search engine relies on biased labeling, the search result will be affected.

Training data: data collection:

The data in LessonLibrary is a log of all online courses. The bias in the data collection is raised when LessonLibrary has a skewed search space; some topics are overwhelmed, but others are forfeited. For example, when users search world music, if most of the courses are about Western music, European jazz bands, or American rock groups, users will be overwhelmed by the choices and therefore neglect the minorities like Zimbabwean music.

Feature selection:

In one of the options, LessonLibrary will ask users to prove their qualifications to search certain courses. However, using certifications or grades on the transcripts as a feature to predict the ability to learn is a prediction based on a biased depiction of the user images. During the admission procedures of the University of Oxford, the admission office weighted too much over a student's A-level grade. A reporter (2018) argued that a pupil with three grade Bs at A-level from a school in a poor educational area likely has more talent and innate ability than a privileged background with a higher score. Therefore, LessonLibrary should not rely solely on certificates; it should also take into account the user's background and other factors.

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