**Class Extractor**

Class Extractor is a Mac application that uses natural language processing to determine what the most important concepts in a college course are. Students can select audio recordings of their professors for Class Extractor to analyze, which in turn will help the student organize and prioritize course topics. There are no apps that provide this functionality in the market currently, meaning Class Extractor has the potential to revolutionize the classroom.

Students upload an audio lecture, optionally with a class PowerPoint presentation, to Class Extractor for analysis. Class Extractor sends the audio recording to IBM’s Watson for speech-to-text transliteration, which Class Extractor receives as an easy-to-parse Javascript Object Notation (JSON) file. At this point, Class Extractor uses the Aylien API to determine what was discussed in the lecture. For example, the Aylien API might return “marginal benefit” for a microeconomics class. The app performs efficient algorithms, including “frecency”, which is a combination of frequency and recency, to determine what the most important topics discussed are. The app combines the results of the audio recording with the results of the lecture presentation to calculate a master overview of the important topics.

Class Extractor presents its findings to the student in two ways: Word Cloud and Timeline. Word Cloud is a series of ovals that each contain a topic name and hyperlinks to the audio recording and to the presentation where the topic can be found. Additionally, the sizes of Word Cloud’s ovals are determined by the importance of the topic they represent. Word Cloud allows for direct comparison of importance between topics, as the size of each cloud is a function of the importance of its topic. Clicking on a topic’s cloud causes the interface to zoom into that cloud and a new word cloud is generated with subtopics of the clicked cloud’s topic. The hyperlinks in each cloud allow fast access to hearing about that topic, making it easy for a student who wants to review a topic to listen to it again. The second interface, Timeline, provides the student with a high-level temporal overview of when different concepts are discussed in a lecture, which concepts they overlap with, and what their subconcepts are. At the bottom of the interface is a timeline bar representing the lecture recording, and concepts are overlaid on top of it. Each topic overlay displays its name, so if a student wants to hear about mitosis in a biology class, he or she can simply click on the mitosis overlay, and the section of the lecture recording concerning mitosis will automatically start playing. If the student wants to review telophase, one of the stages of mitosis, the student can select the telophase overlay to review telophase.

These two interfaces provide students with a powerful and versatile way of manipulating information presented in a class. They facilitate the studying process and help students perform better on exams by making the learning process more efficient and more effective.

There are around twenty million students enrolled in universities in 2015 (NCES). Students stereotypically leave studying and other assignments to the last minute possible, either because of procrastination or because of an inability to organize themselves and prioritize information. This group of students is Class Extractor’s market niche. Currently, their solution to this problem is the same solution that students have always used: to cram studying into one or two nights. Cramming cheats the students out of a true learning process, in which students remember information for longer than the duration of the course, and increases student stress levels. Because of these reasons, this binge-and-purge methodology is ineffective. Class Extractor has the ability to change that.

Furthermore, this market is growing. There are 4.9 million more students enrolled in colleges in 2015 than there were in 2000 (NCES), and the number of Macs on campuses are growing rapidly as well. Just five years ago, Dell was the dominant manufacturer of student-owned laptops, but this year, Apple computers are in first place with 27% of college students owning a Mac (Fortune). While that still means that the majority of student computers are running Windows, the Mac proportion is growing rapidly. While the article offers conflicting reports of how many students are purchasing Macs, with one estimate claiming 47% of students plan on buying a Mac for their next computer and another estimate reporting that 70% of college freshman own a Mac for school, students are buying Macs and the number of people who would be able to run Class Extractor is increasing (Fortune). In the future, Class Extractor will support Windows machines, expanding the user base, but until we have enough resources where there can be active development on multiple platforms, Mac purchasers will be the primary driver of growth.

We will distribute Class Extractor on Apple’s Mac App Store. The App Store reduces costs, both in terms of time and money, in setting up and maintaining servers for distributing the app. Apple charges a $100 yearly developer fee and takes 30% of revenue generated from App Store sales (Apple).

A great benefit of developing for Apple’s platforms is that developer accounts are linked across Mac and iOS. This fact means that with paying the developer fee only once, we can create and distribute apps on both platforms (the 30% fee applies to iOS app purchases as well) (Apple). Since many of the libraries and other required assets are identical across both platforms, it is trivial to port Class Extractor from Mac to iOS, vastly increasing the app’s reach and distribution. Whereas there is not much data on smartphone platform distribution among college students, Apple does have 44.2% of the overall market share in the United States, and that percentage is growing (comScore). Similar to Windows, Android will be supported eventually, but the revenue and momentum generated from iOS and Mac will support having dedicated developers on that platform.

Class Extractor uses two third-party APIs: IBM’s Watson’s speech-to-text API and the Aylien Concepts API, both of which charge a fee for using their services. IBM’s Watson offers the first one thousand minutes of audio per month for free, with $0.02 per minute extra. This cost is going to amount to the biggest expense; a one hour fifteen lecture is 75 minutes, which means that after thirteen lectures, Class Extractor will start incurring expenses. It is possible to negotiate other contract terms with IBM as Class Extractor grows, but it is unknown at this time what the terms of that contract might be.

As for Aylien, Aylien offers several tiers of pricing, and as Class Extractor grows, the tier that Class Extractor is subscribed to will increase. The first tier is $0 per month, and allows for 1000 API calls per day, with overage calls charged $0.01 per call. The second tier is $199 per month, which gives 6000 API calls per day with overage calls charged $0.005 per call. The third tier is priced at $649, with an allowance of 80,000 calls per day with overage calls $0.003 per call, and the fourth tier is $1399 for 180,000 calls per day and overage calls charged $0.001 extra per call. If students take an average of five courses in a semester (students on trimester and quarter schedules will average out to the same as they often take the same amount of courses over the calendar year), twice a week for fifteen weeks, each student will use 150 API calls. Some days may have a higher concentration of calls, such as week days as compared to weekends. Likewise, some periods of the year may have a higher concentration of calls than other times. For instance, many students may opt to use Class Extractor primarily around exam times, at the middle and at the end of the semester (which is twice as often for students on quarters and 1.5 times as much for students on trimesters). With all of these complications, it is difficult to calculate the exact cost of these API calls without real data from users.

To offset these monthly costs, Class Extractor will use a subscription revenue model, with each month costing $5.99. There will not be a contract for subscribing, allowing students to subscribe and unsubscribe at anytime. Feasibly, this means that a student could wait until the month of a major exam, subscribe, receive the results of Class Extractor’s analysis, and then unsubscribe. Students who use this technique of paying less will not have a large impact on our bottom line though; there are only approximately three months in a semester (and even fewer in trimesters and quarters), which means that there is not enough time for unsubscribing to have an effect on savings for the student or on the revenue of Class Extractor. There is a high likelihood that there will be at least one exam per month that Class Extractor can help with, which means that it benefits students to stay subscribed. In the summer, subscriptions will probably decrease, but there are plenty of students who take summer classes. Even if those numbers are not too high, subscriptions will increase again come the Fall term.

What makes Class Extractor particularly ripe to succeed is that there are no close competitors. There are various tools and services for students to help them manage their classes, but none that help in the way that Class Extractor does. For instance, BlackBoard allows for student-professor communication, making it easy for professors to make announcements and for students to submit assignments. Piazza creates an informal space where students can communicate with each other and with the teaching staff. iStudiez Pro makes managing logistical course information easy, by helping students keep track of course deadlines and other due dates. None of these or any other learning tool does anything similar to what Class Extractor is aiming to do.

Education is one of, if not the, single most important thing that can be given to the future of humanity. Education rises people up and pushes the human race to bigger and greater feats. College education helps towards that goal, as the density of information that is synthesized and assimilated in the undergraduate years is more than at any other time in one’s life. Often, students do not see it in that light though. They sometimes see it as something to skate by, sometimes doing the bare minimum. In that environment with that mindset, information is not truly learned, but is rather caught in short-term memory for a few weeks before being forgotten. Class Extractor can turn this faux-learning process into a genuine learning process, in which information is retained for longer than the duration of a course. It is in this case that information can be passed on to future generations of humanity.

Class Extractor can meaningfully enhance a student’s education. Through Word Cloud and Timeline, students can easily see the most important information in a lecture and prioritize their studying accordingly. These interfaces save students the time and frustration of having to wade through pages of notes, presentations, handouts, lecture recordings, and assignments to find the information they are looking for, even if information ends up not being relevant.

Class Extractor’s net effect on society is that more capable, knowledgeable, and skilled people will be entering the workforce out of college. These students had the advantage of Class Extractor helping them organize and prioritize the information in their classes, leading to them remembering and internalizing more information. When students use Class Extractor in school, a positive feedback loop is created; a student uses Class Extractor for classes, who gains comparatively more useful information, who then applies that information to future classes in which the student uses Class Extractor, and so on. This loop leads to better internships in which the student can perform at a higher level with their knowledge that other students who did not use Class Extractor did not have, which then leads to better careers after graduation (or, if the student prefers, acceptance to more competitive graduate schools).

A future application of Class Extractor is in the globalization of education and knowledge. In areas without strong education systems or that cannot afford higher education, people, both kids as well as adults, can access online classes. Class Extractor can facilitate their learning process as well, as if these people are working or have families and may not have a lot of time to dedicate to these classes but still have a strong desire to learn, the important topics can be generated and organized for them such that learning is easier.

One possible issue with Class Extractor that detractors might mention is that it may be possible for students to skip class, just downloading the lecture recording the professor posts online and studying directly from Class Extractor’s analysis; the student would have to put in even less effort than he or she may be putting in now. While it is possible that a student may choose to take this route for studying, he or she only ends up shortchanging himself or herself out of the learning process even more. The purpose of Class Extractor is to augment and enhance the learning process, not replace it. In a world in which every student uses Class Extractor, going to class would still be beneficial. If a student attends class and then listens to the recording, the student would hear the lecture twice, which reinforces the material. The student can also specifically pick out topics he or she did not understand, and listen to those sections again for clarification. If a student never attended lecture and then had Class Extractor analyze all of the lecture recordings, it may seem like the app is giving that student an unfair advantage. But in reality, the same student who is never going to go to class now is the student who is going to look through the topics briefly the night before the exam, think everything is understood, and then take the exam and realize how lacking their understanding really is. Plus, being able to ask a question in class is invaluable; even if the professor holds office hours or is accessible over email, nothing compares to having an interactive discussion about confusing material as it is taught, of which neither of the aforementioned ways of asking professors questions offer.

Another potential issue critics may argue is that the software incentivizes students to learn material to the test rather than grasping the material in a broader sense. This idea is also a nonissue; in a well-designed course, the test is an accurate reflection of what was discussed in lecture. This reflection means that regardless of Class Extractor’s involvement in the studying process, if a student studies material from class, then they are implicitly studying to the test. If a student acts like the first student mentioned in the above paragraph, then the material discussed in class, regardless of its presence on exams, will be understood and internalized better. In this sense, Class Extractor encourages studying not to the test, but rather for the test; it is going to pick all of the important topics in a class, not just what the professor explicitly says will be on the exam.

Class Extractor has the potential to revolutionize the way course material is studied and learned. It has profound implications for those who use it, potentially leading to greatly improved performance on exams and more successful careers after graduation. And in addition to providing this massively positive social impact, Class Extractor has an incredible revenue stream supporting it in a market that has never seen anything like it before. Class Extractor will change higher education for the better.

**Works Cited**

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