Feynn Labs Report

Ed-Tech Industry

Segmentation Analysis

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Link to the dataset :
https://www.kaggle.com/datasets/marlonferrari/elearning-student-reactions

- ## Fermi Estimation

  Scientists often look for Fermi estimates of the answer to a problem before turning to more sophisticated methods to calculate a precise answer. This provides a useful check on the results. While the estimate is almost certainly incorrect, it is also a simple calculation that allows for easy error checking, and to find faulty assumptions if the figure produced is far beyond what

we might reasonably expect. By contrast, precise calculations can be extremely complex but with the expectations that the answer they produce is correct. The far larger number of factors and operations involved can obscure a very significant error, either in mathematical process or in the assumptions the equation is based on, but the result may still be assumed to be right because it has been derived from a precise formula that is expected to yield good results. Without a reasonable frame of reference to work from it is seldom clear if a result is acceptably precise or is many degrees of magnitude (tens or hundreds of times) too big or too small. The Fermi estimation gives a quick, simple way to obtain this frame of reference for what might reasonably be expected to be the answer.

1) Data Sources (Data Collection)

This Dataset was compiled after 4 months of an Algorithm Introductory Class at a Brazilian University.

A traditional grading system was adopted for evaluation of the student's performance, and, at the same time, an online environment let students share posts, answers and classify productions with emoji's-based reactions.

The Class was project-based and the evaluation of the skills followed the so-called "21th Century Skills", in a scale from 0 to 10 each Skill:

- Critical Thinking and Problem Solving Skills - named as SK1;
- Creativity and Innovation Skills - named as SK2;
- Constant and Self Learning Skills - named as SK3;
- Collaboration and Self-Direction Skills - named as SK4;
- Social and Cultural Responsibility - named as SK5.

2) Data Pre-Processing (Steps and Library used)

- Pandas and Numpy for basic loading , reading the dataset and basic mathematical operations.

- Matplotlib for basic plotting data and data visualization.

- Seaborn – Basic data visualization library based on matplotlib. It provides a high level interface for drawing attractive and informative statistical graphs.

- Sklearn (For train_test_split) for the purpose of training and testing the datastet.

3. **Segment Extraction(ML techniques used):**

The machine learning technique used is XGBOOST. XGBOOST, which stands for Extreme Gradient Boosting, is a scalable, distributed gradient-boosted decision tree (GBDT) machine learning library. It provides parallel tree boosting and is the leading machine learning library for regression, classification, and ranking problems.

It's vital to an understanding of XGBoost to first grasp the machine learning concepts and algorithms that XGBoost builds upon: supervised machine learning, decision trees, ensemble learning, and gradient boosting.

Unique features of XGBoost

XGBoost is a popular implementation of gradient boosting.

Let's discuss some features of XGBoost that make it so

interesting.

- Regularization: XGBoost has an option to penalize complex models through both L1 and L2 regularization. Regularization helps in preventing overfitting
- Handling sparse data: Missing values or data processing steps like one-hot encoding make data sparse. XGBoost

incorporates a sparsity-aware split finding algorithm to handle different types of sparsity patterns in the data

- Weighted quantile sketch: Most existing tree based algorithms can find the split points when the data points are of equal weights (using quantile sketch algorithm). However, they are not equipped to handle weighted data. XGBoost has a distributed weighted quantile sketch algorithm to effectively handle weighted data
- Block structure for parallel learning: For faster computing, XGBoost can make use of multiple cores on the CPU. This is possible because of a block structure in its system design. Data is sorted and stored in in-memory units called blocks. Unlike other algorithms, this enables the data layout to be reused by subsequent iterations, instead of computing it again. This feature also serves useful for steps like split finding and column sub-sampling
- Cache awareness: In XGBoost, non-continous memory access is required to get the gradient statistics by row index. Hence, XGBoost has been designed to make optimal use of hardware. This is done by allocating internal buffers in each thread, where the gradient statistics can be stored
- Out-of-core computing: This feature optimizes the available disk space and maximizes its usage when handling huge datasets that do not fit into memory

4) Selection of target segment:

The digital learning market in India is categorized into the following segments: K-12, test preparation, online certification, skill development, and enterprise solution. The major growth drivers of these segments include a large addressable market, convenience, price advantage, as well as pandemic-led disruptions, aided by ever-evolving technology capabilities.

K-12: With the current enrolment of more than 250 million, the K-12 segment is the largest and most attractive segment for digital learning providers in India. In this segment of e-learning, further, sub-segments include smart class solutions, online tutoring, online preparation for exams, simulation and virtual reality, STEM learning, AR and robotics, and assessment. Prominent Indian players in this segment are Cuemath, STEPapp, Whitehat Jr, and CampK12.

What is the K-12 education system?

This rising concept of K-12 education has changed the conventional way of educating people and ensured the basic elementary education of children from kindergarten to 12th

grade. Primary and secondary education collectively known as K-12 education involves more teacher-student communication. In the K-12 educational model, the letter K stands for Kindergarten, and 12 stands for 12th grade and includes kindergarten, primary, secondary, high-school, and pre-university education in India.

The K-12 Indian Education System

According to a report, there are 1.46 million k-12 schools in India out of which 54 percent are owned by the state or central government, 21 percent by municipal corporations, and the rest 25 percent are privately owned. These K-12 schools are affiliated with the State Board, CBSE, and even CISCE. Statistics for affiliation are as follows: 96% by state board schools, 1% to CBSE, 0.1% to CISCE, and 2% are unrecognized out of all K-12 schools in India.

The K-12 model is among those revolutions that the Indian education system has broadly accepted and made compulsory to adopt for both private and government schools. In K-12, there is a lot of teacher-student interaction where the teacher

encourages a lot of question-answer sessions, and assignments to promote advanced learning habits in students. This education system supports individual attention. This method is more into developing the self-educating capabilities of students. Here the students are encouraged to add value to their assignments in the form of personal views and ideas that makes this system more beneficial than the conventional education systems. Students are also open to taking participating in various discussion clubs and forums to present their ideas and views.

More teacher-student harmony, more self-reliant and independent individuals who can create difference not just for the schools but the entire society, is what this technology-based k-12 education system has to offer.

5) Customizing the Marketing Mix:

Track the Marketing Results of Your Edtech Company:

The education industry is a competitive market, and the average school and student will have options. That is why having a refined strategy that appeals to educators and

prospective student requires a plan based on experience. An essential way to ensure a successful campaign is to track your results and alter your marketing efforts based on the data you receive.

Business intelligence that gives you information on the effectiveness of your various marketing funnels will help you understand your target market better. Businesses that employ data-driven personalization delivered 5-8x the ROI on their marketing spend compared to companies that didn't.

Education companies are all about learning, and they shouldn’t limit that to just their edtech product. Learning from your edtech marketing campaigns results will allow you to put the necessary tweaks on your outreach to better connect with your target demographic.

Utilize Automation for Landing Pages:

Marketing automation software allows companies to open more time for other tasks by effectively mechanizing certain components of outreach. Many companies utilize automation to scale their outreach and create more free time for marketing and sales teams.

In the edtech sector, marketing automation plays an important role. According to Startup Bonsai, 76% of automation marketers see a positive ROI within a year. One aspect of the sales funnels that edtech marketers could look towards automating is their landing pages. For example, suppose a potential buyer takes a particular action on the website such as filling in a form or subscribing to updates. In that case, there should be an automated response that pushes them deeper into the funnel.

Automating your lead capture systems like landing pages will save your business a significant amount of time. The best business models are ones that allow employees to maximize their time and productivity.

Manually responding to potential customers' buyer actions isn't a scalable solution. Marketing automation gives businesses powerful tools that can be customized and set up to improve the buyer journey and free up employees to focus on other tasks.

Educate with Inbound Marketing:

Many education companies have realized that inbound marketing is the key to reaching potential customers, regardless of whether your ed-tech product is an online school or training software.

Inbound marketing in ed-tech can consist of several components. Blogs, high-quality content on social media platforms, and Search Engine Optimization are critical parts of a cohesive ed-tech inbound marketing strategy.

Overall, a successful inbound strategy revolves around content marketing in a way that appeals to the interests of your prospective customers.

Some examples of what an edtech inbound strategy could look like are blog posts detailing interesting lesson plans or social media video marketing showing the importance of quality education. The type of inbound content they will create is up to companies' discretion, but it must be personalized and enjoyable to your target market.

Content marketing generates three times as many leads as outbound marketing and costs 62% less. This is an essential

strategy for edtech because many businesses are oriented toward younger demographics.

Finding a way to natively appeal to them is extremely important, and social media and other forms of inbound marketing go a long way toward connecting with young audiences. Student engagement is the primary goal of most edtech companies' marketing outreach, and inbound marketing is a top way to engage prospective students and other decision-makers.

Segment Your Email Marketing:

Email marketing is a form of inbound or outbound marketing, depending on whether the prospective customer is subscribed or not. Email campaigns are an important way to reach students, educators, and parents, as email is a globally significant form of communication with over 4 billion daily users. Emails allow companies to reach out very directly to specific customers and are useful across areas of the edtech industry.

One of the best ways to improve the effectiveness of email marketing is through segmentation. Segmentation is dividing

an email list into different types of consumers and tailoring the content towards the different groups.

For example, if your business is a student success platform that has a basic plan and a premium plan, you can segment your emails into different age groups or try to sell other plans.

According to Campaign Monitor, marketers who used segmented campaigns noted a 760% increase in revenue.

Like many other components of marketing, personalization is a significant factor in your email outreach. This is why segmentation is critical. You don't want to be sending every customer the same thing because most businesses have different offerings for different customer types, and each targeted group will have different marketing preferences.

Email marketing is an impactful way to directly generate leads, and by segmenting your email marketing campaigns to different contacts, you can more effectively and personally reach desired audiences.

6) (for Business Markets)Potential customer base in the early market, thereby calculating the potential sale (profit) in the early market (Potential Customer Base * Your Target Price Range = Potential Profit):

The revenue model is the best way to understand the complex workings of a start-up. It gives one a clear idea about which revenue source would be better to pursue. It is important for a start-up to be aware of what value to offer, the price the value, and who pays the value. But before you get into all that, when starting Ed-Tech companies it is imperative that you understand the education sector. This will not only help you build a great offering to base your company around but will also give you an insight into the needs of the students and teachers.

This will ensure that your offering doesn't wind up as an obsolete tool. The education sector is a marketplace like none other with a lot of opportunities and complications. So, if you have a ground breaking idea for the education sector but are clueless about how to monetize it, keep your eyes glued to the following revenue models that are adopted by several Ed-Tech companies.

Git-Hub Link for the code :

https://github.com/Abhishek-mahajan02/ONLINE-STUDENT-SUCCESS/blob/main/STUDENT_SUCCESS_ONLINE_PY.ipynb