question 95 views

CUSUM for customer detection?

Just wanted to throw out an idea that I initially thought of as I went through the case and see if anyone had any thoughts on this approach or if it didn't make sense at all.

My first thought when watching the intro video was that this case kind of reminds of the CUSUM problem we had to look at a few weeks back to detect a change in temperature. In the same way, we could use CUSUM to detect a change from a customer owing nothing and meeting all bills on time to a customer that will never pay their bills. So I would calculate the amount owed each month for each customer and we could calculate the CUSUM and pick a threshold above which we would want to select the customer to possibly turn off their power. In this case the baseline mean would be zero. In the same way we could adjust the threshold in a way to try to avoid false detections (just as we would try to avoid false detections in the summer to winter example) where maybe the customer owed money but then paid it back and their balance went back down to zero

The benefit of this type of analysis is that it does not require that much data collection and would be simpler to implement than a factor based approach. If just as effective or almost as effective as a more complex method maybe a good option as it is a much simpler approach. We could also maybe try to adjust the threshold based on factors such as customer credit history or some other factors that are mentioned in the video

hw8

Updated 1 day ago by Heidi Shiau

the students' answer, where students collectively construct a single answer

I do not understand how the amount owned each month is relevant to your model. Do you think we could simplify your CUSUM model by only using 0 if paid and 1 if not paid? However, at that point you would just be counting the number of consecutive unpaid bills to determine if the power should be shutoff. For example, we would shut off their power after 3 consecutive unpaid bills because at that threshold they are unlikely to pay.

But I think you may be onto something by accumulating the amount owed. The accumulated amount owed is a useful factor. It represents a debt that could still be recouped. The power company may want to treat these accounts differently because they have a potentially higher value that someone who has only incurred a small amount of debt.

Updated 1 day ago by Armand Lapuz

followup discussions for lingering questions and comments

Resolved Unresolved

Kyle Foerster 1 day ago
I actually thought of this same thing initially. My primary concern with this was that there's not really a way that I can think of to account for whether the customer went from being able to pay their bills on time to suddenly not being able to pay the bill at all. For example, if the customer received a massive amount of medical bills or lost his / her job, then they may not be able to make the same payments they once were able to. Using CUSUM, they'll probably pass over the threshold pretty quickly.

It's possible that once a customer passes over the threshold they can be analyzed some more to determine whether they'll never pay, or if they are a customer that is just landing on some hard times.

Again, these are just my thoughts as well and I'm not sure if there's an easy way to account for this or not.

Heidi Shiau 1 day ago That's a good point. I'm also wondering if there's a way to weight more recent payments too as CUSUM penalizes them equally. If someone missed a payment a few years ago, it should not have the same weight as missing a payment last month.

Unfortunately, I think it would difficult to be able to weed out customers as you described that lost their job or receiving medical bills using any modeling technique so my thought is that the only approach is to reach out to customers and give them the opportunity to pay or show they cannot pay prior to shutting off their power, but I like the idea of only using the model as a baseline and evaluating a customer more before making the final determination

Resolved Unresolved

Tim Wilcox 1 day ago I think this is a great idea. I was also thinking that it might be useful to use CUSUM in combination with exponential smoothing to determine if weather had a measurable impact in either power usage or homeowner's inability to pay their bill.

Resolved Unresolved

Anita Xue Xia 3 hours ago
this is an interesting idea...I guess it is similar to a classification model in giving a customer a binary assignment for whether they will pay for the bills, but at the same time does it make sense to use the same mu across customers?