Apollo BA Take-Home Challenge

Objective

The objective of this home assignment is to evaluate the following:

1. Experience in problem solving. Using the provided information, create a hypothesis and test it using data.
2. Experience in analyzing data sets. With the data at hand, test whether the hypothesis is true or false and provide insights with the help of visualizations and calculations.
3. Experience in Business Analytics. Provide a conclusion to the analysis and transform the newly gotten information into a recommendation.
4. Ability to translate learnings and points of view into writing (in English), and be able to share with others in an interview.

Welcome to the BA application process!

Thank you for applying to one of our positions in the Business Analytics team at Stori! This step helps us evaluate basic competencies of the area:

- *problem solving skills;*
- *basic data manipulations;*
- *getting insights and recommendations from data;*
- *written communication in English.*

To help you achieve this goal, we ask you to do the following:

1. *Take your time to look at the material provided, which includes:*
    a. *a description of the case to solve;*
    b. *an Excel file with data that can help you do the required analysis.*
2. *Answer the questions in the case (we will evaluate your answers!). We hope that they can guide you in your thinking process. Try to answer as many questions as possible and complete at least one of the two parts of the analysis.*
3. *Attached to your answer, we require the evidence of your analysis in the form of an Excel file or a Python notebook. In some cases, we will ask you explicitly for SQL code, which you can deliver as simple text.*

You will have 3 business days from the delivery of this home test to submit your response.

Both the case and the data provided are completely made up. Any resemblance with reality is pure coincidence.

We hope that you enjoy solving this case and that it gives you a glimpse on the kind of work we do for the BA team at Stori!

Case description

Part 1: Analysis of the state of the business.

You are a business analyst working for a startup that has one credit product called Contigo. Depending on their risk level, the customer will receive:

1. **Contigo A**, a $1000 MXN loan to be paid in full after one month with 15% interest. This product is given to higher risk customers (less likely to pay back).
2. **Contigo B**, a $2000 MXN peso loan to be paid in full after one month with 10% interest. This product is given to lower risk customers (more likely to pay back).

The team has set the interest rates for the Contigo product from past debt delinquency (DQ) rates, meaning these are the interest rates that maximize total profits – the # of accounts times the per-account net income. Note that higher interest rates drive higher average per-unit net income, but attract fewer customers to open accounts.

However, Contigo's delinquency rates have been rising. It is estimated that the monthly DQ rate for Contigo A will be **13.5%** and **6%** for Contigo B through the end of this year. For the purposes of this case, we're defining DQ rate as #accounts_that_did_not_pay_back / #total_originated_accounts. The payback outcome in the numerator is binary – either someone paid back their total debt or they did not pay at all. Contigo does not allow partial debt repayments.

Ignoring the worsening of DQ rates, your startup has an ambitious growth plan for the year. At month 1, the company had a total of 5,000 Contigo A customers, expected to grow at a rate of 25% month-over-month. Contigo B has a larger share of customers, 10,000 in total. But with a very competitive market for premium loans, Contigo B is expected to grow at a 10% month over month rate throughout the year.

The operational cost of this startup scales proportionately to its customer base, with negligible fixed expenses. The current monthly operating cost per account sits at $30 MXN.

Leadership is concerned that the change in DQ rates and the aggressive expansion may reduce profitability in the following months, so they asked you to make a forecast on the net income of its operation (ignoring taxes) in the next 12 months.

Questions:

1. What factors may be against the profitability of the startup? What should we look at in an analysis of the net income for the following months?
2. Is this startup going to be profitable during the next 12 months? What are the major trends driving changes in net income? *Suggestion: Build a model for net income and forecast it for the next 12 months. Hint: losses come from the total debt not being repaid, and revenue comes from collected interest. We will only consider operation costs as expenses.*
3. What changes are required to sustain the business not only throughout the year but in the long run? Build a proposal of changes to main startup KPIs to achieve this goal. Discuss what difficulties the startup may find in applying your recommendation.

Part 2: Analysis of a collection strategy.

The Credit department has decided to prioritize collections on Contigo A customers, since they have a higher DQ rate. A collections analyst has determined that a DQ rate of 10% will be enough to render this

customer segment profitable. The team has decided to apply immediate action from month 1 and is looking for a collection strategy to recover (at least!) 175 of the 675 accounts that went delinquent, out of the starting 5,000 Contigo A accounts.

One idea is to collect by calling the customer. Using the previous collection results, the data science team has created a model to estimate contactability (i.e. the probability of reaching the customer successfully by calling) and has delivered their calculations to you (*please, consult the spreadsheet called* contactabilty_scores). The collections team estimates that the customer will pay around three quarters of the time after being contacted, and it has no chance to pay if they never connect the call. Calling the customer is quite expensive! Operations has determined that a phone call campaign costs around 30 pesos per DQ customer, regardless of the contact result.

Questions:

1. Assuming that we launch this campaign to all of the 675 DQ customers, a manager asks you to compute the probable result of this campaign, asking you to deliver estimates on the following KPIs:
    a. Recovered accounts.
    b. Recovered total debt.
    c. Revenue coming from collected interest. (Note that the total debt collected is not included in revenue, why?).
    d. Total campaign cost.
    e. DQ losses coming from uncollected total debt.
    f. Collections income.

    Deliver your calculation in a spreadsheet, and attach a SQL code computing these results using the contactability score data provided by the data science team.
2. What is the impact delivered on overall business performance by this campaign? To answer this question, we provide the results of month 1 without collections in the table below. Using the results from the previous question and the data coming from the table, provide a justification for applying or not this collection strategy.
3. Discuss some possible improvements to this campaign.

Table 1. Performance of Contigo A at month 1.

Month	Accounts	DQ accounts	Interest revenue	DQ losses	Operative cost	Net income
1	5,000	675	$648,750.00	$675,000.00	150,000	-$176,250.00