

Sanlo Coding Challenge: Invest in App Revenues 🎮💰

👋 Hello, and welcome to our coding challenge. We're excited to have you at this stage. We hope you have fun solving it! It's been designed to give you a glimpse into some of the problems we're solving at Sanlo. If you have any questions, please email the hiring manager.

Good luck! 🍀

Background

- At Sanlo, we extend capital to mobile gaming and app companies to help them grow their businesses.
- Mobile gaming and app companies generate **revenue** by monetizing customers through in-app purchases, ads, paid app downloads or app subscriptions.
- In order to determine which companies we should extend capital to, we analyze the performance of their apps by extracting key **financial ratios**, which are used as risk signals to evaluate their **credit risk rating**.
- A credit risk rating is made up of a **risk rating** and a **risk score**.
- Sanlo extends capital to mobile gaming and app companies whose apps have healthy risk ratings.

Goals

You will be provided with a list of companies and the performance of their games or apps. Your task is to write a program that consumes this data, calculates financial ratios, and evaluates the credit risk rating of each app. The credit risk rating helps us determine which companies we should extend capital to.

Input

You will be provided with two CSV files describing app companies and the daily financial metrics for the companies apps over the time period of one calendar month. The model for these CSV files are described below.

app-companies.csv

Each row in this file represents an app company.

Field	Type	Description
company_id	Integer	The unique ID of the app company.

company_name	String	The business name of the app company.
country_code	String	The country code indicating where the company is based.

app-financial-metrics.csv

Each row in this file represents the financial metrics collected at the end of the business day for an app.

Field	Type	Description
date	Date	The date when the financial metrics for this app were recorded.
app_name	String	The name of the app.
company_id	Integer	The ID of the company that develops this app.
revenue	Float	The revenue that was earned on this given date for this app. If no revenue was earned then the value could be 0 or empty.
marketing_spend	Float	The amount of marketing that was spent to promote the app in the hope of generating new installs or bringing existing players back to the app.

Financial Ratios

As part of the evaluation process, financial ratios are calculated from the app metrics and combined to arrive at a risk rating and risk score. For the purposes of this exercise we will want to calculate just two financial ratios: payback period and LTV:CAC ratio.

Calculating Payback Period

The payback period is the amount of time it takes to recover the cost of an investment. For the purposes of this exercise, time is represented in days. We calculate the number of days required within the reported month in order to recover the marketing spend.

Example

If an app company spends \$40,000 marketing an app on January 1st and it makes \$7,000 in revenue equally each day for one week, then the payback period for this app is 6 days:

At 5 days: $\$7,000 + \$7,000 + \$7,000 + \$7,000 + \$7,000 = \$35,000$

At 6 days: $\$7,000 + \$7,000 + \$7,000 + \$7,000 + \$7,000 + \$7,000 = \$42,000$

The company has recovered all its marketing spend on day 6.

Calculating LTV:CAC ratio

The LTV:CAC ratio measures the lifetime value of a customer and the cost of acquiring that customer. It is an indicator to assess profitability. For the purposes of this exercise you can assume that revenue is the same as LTV but in reality they are different.

Example

If an app company spends \$40,000 marketing an app on January 1st and it makes \$2,000 in revenue equally each day for the entire month of January, then the LTV:CAC ratio for the period is:

$LTV = \$2000 * 31 = \$62,000$

$CAC = \$40,000$

$LTV:CAC \text{ ratio} = \$62,000 / \$40,000 = 1.55$

Evaluating Credit Risk Rating

A credit risk rating is made up of a risk rating and a risk score. The combination of financial ratios that we extract from the performance of the app's financial metrics are used to determine an overall risk rating and risk score.

The financial ratios (risk signals) carry a weighting that contributes to the overall risk score.

Risk Signal	Risk Score Weighting	Maximum Score
Payback Period	70%	70
LTV:CAC Ratio	30%	30

The sum of the weighted scores from each risk signal determines the **risk score**.

Payback Period	Value
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Less than 7 days	100
7 - 13 days	80
14 - 20 days	60
21 - 27 days	30
28 days or more or never reachable	10

LTV:CAC Ratio	Value
3.0 or higher	100
2.5 to less than 3.0	80
2.0 to less than 2.5	60
1.5 to less than 2.0	30
Less than 1.5	10

Risk Rating	Risk Score	Definition
1 Undoubted	85 - 100	- Virtually no risk - Outstanding app performance
2 Low	65 - 84	- Minimal risk of credit loss - Strong app performance
3 Moderate	45 - 64	- Good app performance margin/LTV
4 Cautionary	25 - 44	- Deteriorating app performance - Risk of credit loss
5 Unsatisfactory	15 - 24	- High risk of credit loss
6 Unacceptable	< 14	- Definite loss evident

Example

Payback Period = 15 days => 60

LTV:CAC ratio = 1.99 => 30

Risk score = $(60 * 0.7) + (30 * 0.3) = 42 + 9 = 51$

Credit Risk Rating

Risk Score = 51

Risk Rating = Moderate

The input data for this example is provided for you so that you can validate the logic. Please see files:

- example-app-companies.csv
- example-app-financial-metrics.csv

Deliverables

Your program should consume the input data, calculate the financial ratios and determine a credit risk rating for each app.

Please include instructions on how to run your code. If a build step is required, please also provide instructions on how to build it.

Your program should output one file:

app-credit-risk-ratings.csv

This file should be sorted by risk score in descending order.

Field	Type	Description
company_id	Integer	The ID of the company.
company_name	String	The name of the company.
app_name	String	The name of the app.
risk_score	Integer	The risk score.
risk_rating	String	The risk rating.

After completing a working code solution, you should include a write-up answering the following questions as best you can:

1. How long did you spend working on the problem? What was the most challenging part for you to solve?
2. How would you modify your data model to account for new risk signals that could be added to improve accuracy of determining credit risk?
3. Discuss your solution's runtime complexity.

Please feel free to include any additional comments to this write-up.

You should send us a zip file containing:

- The source code to your program
- The output files produced by your program
- Your write-up.

Evaluation

Your code solution will be evaluated on the following criteria:

Criteria	Description
Correctness	- Does your code compute the correct financial ratios, risk scores and risk rating?
Maintainability	- Is your code clean? - Is it well-organized and structured? - Is your code easy to read? - Is your code open to extension?

Additional Notes

- You may use any language you like. The languages we use at Sanlo are JavaScript, Python, Java.
- You can use any external libraries that you wish. This might help with the parsing of CSV files for some languages.
- It should take you 2-3 hours to write a minimal working solution and thoughtful analysis. However you may wish to spend as much time as you want on the problem. If you have more time we encourage you to demonstrate your code organization skills that may involve design principles and design patterns.