

# Case study: call center

*Week 6*

This document walks you through the lab session for the week 6 case study on determining the staffing levels at a call centre.

## Learning objectives

By the end of this lab session you will be able to:

- use basic probability calculations on actual data to solve a basic staffing requirement problem.

## Case study

You are employed in the call-center of a bank that provides 24 hour assistance to its customers through a help-line. One of the call-center's key performance indicators is the amount of time that customers have to wait for an available agent. This should be kept as low as possible. When a customer phones in, they have the option to either go through an automatic process and do a self-help via number prompts, or they can wait for the next available agent. To complicate matters further, customers are classified into one of three groups:

- platinum: customers that have a lot of money at the bank;
- gold: customers that have a fair bit of money at the bank; and
- silver: customers that don't have that much money at the bank.

The bank currently has 75000 customers and expects its client base to grow to over 100000 clients in the next year. The client base is therefore expected to grow by a factor of 1.33. They further want to setup a dedicated line for the three customer groups, each with its own agents. The proportion of platinum, gold and silver clients, as well as the call habits of clients are expected to stay the same.

It is your job to estimate staffing levels for the platinum, gold and silver lines using the following guidelines supplied by Human Resources:

- for the platinum group there has to be one agent for every 10 calls expected over a day that require an agent;
- for the gold group there has to be one agent for every 20 calls expected over a day that require an agent; and
- for the silver group there has to be one agent for every 40 calls expected over a day that require an agent.

## Study design and available data

To determine the staffing levels we will need historical data on the calls made to the call center. The bank records their calls for quality purposes. Over the last 30, for each call, they recorded the time that a client called in, the client's classification and whether the caller wanted to speak to an agent or used the self-service functions.

The data is available from the `callLog.csv` file.

## Instructions

Determine the staffing levels per client group when the client numbers increase to 100000. Your final answer should be in number of agents per client segment. Note that the agents have to be appointed on a permanent level in advance, and cannot vary from day to day. You have to give a single level, therefore you are NOT

required to give different levels depending on the day of week, or month, etc. You can ignore time-based trends, such as time of day, day of week, or month of year.

To determine the staffing levels you need to estimate the following:

- expected number of calls from platinum, gold and silver customers that will require an agent to assist the customer.

In addition to the number of expected calls, the variance in the number of calls will also influence the staffing levels. For instance, you may want to work on a worst cases scenario and work with the highest possible number of calls. Or you can work on the mean number of calls and then build in a safety factor according to the variance.

A good place to start is to view the data, get a feel for it, and then to decide on which analysis in the form of figures and tables will be useful in our analysis. Thereafter conceptually try and figure out how you will determine the staffing levels, keeping in mind that the expected number of calls and daily variance in calls may influence our staff requirements.

Don't be scared to try different methods for calculating the staffing requirements. The idea is to try different stuff and then keep the ones that work.

## Getting started

Complete the following steps to get started with the assignment:

- create a new RStudio project, download the data files from clickUP and copy or move the data files to the RStudio project directory;
- create a new R script file to save your analysis;
- use RStudio to load the data as a dataframe and apply basic data exploration techniques to answer management's questions.

## Useful commands

Functions, as described in the DataCamp chapters and the previous lab that may be useful include:

- `mydata <- read_csv(...)`
- `names(mydata)`
- `head(mydata)`
- `tail(mydata)`
- `summary(mydata$someField)`
- `subset(mydata, mydata$someField > someValue & mydata$someField < someValue)`
- `hist(mydata$someFieldX)`
- `barplot(mydata$someFieldX, mydata$someFieldY)`
- `boxplot(mydata$someField)`
- `boxplot(mydata$someField~mydata$someCategory)`
- `table(mydata$someField, mydata$someCategory)`
- `mean(someValue)`
- `sd(someValue)`
- `min(someValue)`
- `max(someValue)`
- `prop.table(mytable,x)`