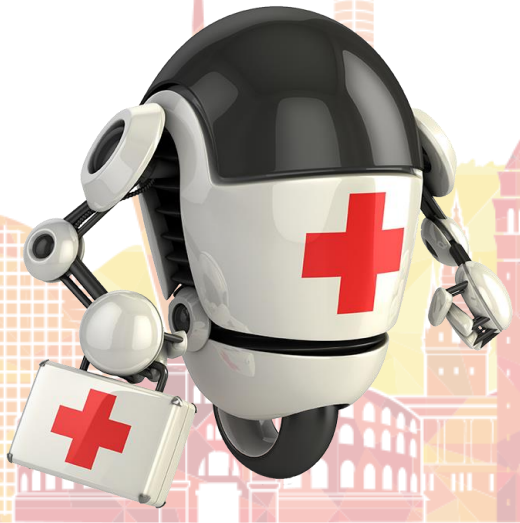
BARCELONA | JUNE 2ND & 3RD

DIGITAL HEALTH HACKATHON

#ACCENTUREHACKATHON



accenturedigital

CLÍNIC BARCELONA
Hospital Universitari

Speakers

JAIME RODRÍGUEZ
EALA SCA Lead

DRA. CAROLINA GARCÍA-VIDAL
Hospital Clínic

SANDRA OROZCO
Accenture Data Scientist

DELIA LÓPEZ
Accenture Data Scientist

Agenda. 2018 Hackathon

2nd of June 2018

09h00 – Welcome
09h15 – Breakfast
09h40 – Presentations
10h30 – Hackathon Begins
13h30 – Lunch
17h30 – Coffee Break
20h30 – Dinner
01h00 – End of Day 1

3rd of June 2018

09h00 – Breakfast
10h00 – Last Analytics Submission
11h00 – End of Submissions
11h45 – Top Finalists Announcement
12h00 – Use Case Presentations
13h00 – Jury Discussion
13h30 – Prizes and Winner Announcements
14h00 – Lunch
16h30 – Event Closure

Main objective. 2018 Hackathon

Using machine learning techniques you will be asked to develop an algorithm to predict which patients are most likely to develop an illness.

Due to certain cancer treatments, some patients' immune system deteriorates. They are likely to suffer from **Febrile Neutropenia** and there is a considerable risk that they might develop a possibly-fatal disease called **Bacteremia**.

Bacteremia is a severe life-threatening infection. Adequate initial antibiotic treatment is a key to improving patients' conditions, but in recent years such infections caused by bacteria resistant to different types of antibiotics has increased, thereby increasing mortality rates.

As a result patients are given broad spectrum and expensive antibiotics, or other therapies with toxic side effects, right away even if they might not have an infection. Conversely, inadequate initial empiric antibiotic therapy significantly affects the prognosis of patients so **clinical algorithms to predict which patients are at risk of MDR-infections are urgently needed!**

Can you help the doctors?

Analytics Goal

	Problem	Solution
Analytics 	Difficulty of correctly diagnosing a patient taking into account big amounts of data	Build an Analytics Machine Learning Algorithm capable of providing a diagnosis using all the available data

Hackathon Datasets

Train.csv

MDR	→ **Target Variable** (Multi-drug resistant)
ID	→ Unique Patient Episode ID
NHC	→ Unique Patient Number
Gender	→ Gender of Patient
start_neutropenico	→ Patient's First Day with Low Neutrophil
start_FN	→ Start of FN period
days_between	→ Days in between 2 FN episodes
days_in_hospital	→ Days in hospital between entry and FN
prev_hospital_stay	→ Number of past admittances
birth_year	→ Patient's year of birth
Emergency	→ Whether Patient entered from Emergencies
no_movements	→ Number of room changes before FN
no_consult	→ Number of consultancies before FN
Past_positive_result_from	→ Culture of patients' past positive diagnoses
Dummy_ABCXYZ	→ Whether patient had certain past diagnoses
antibiotic_count	→ number of different antibiotics the patient took before FN
days_after_anti	→ Days between last intake of antibiotics and FN start
ABCXYZ_.MG.	→ Antibiotics taken before FN in milligrams
ABCXYZ_.UND.	→ Antibiotics taken before FN in units
Auto_TP	→ Number of auto transplants before FN
Alo_TP	→ Number of allo transplants before FN
room_list	→ List of room numbers patient stayed in before FN
mucositis	→ Whether patient ha mucositis when FN started
cito_group_1/2/3	→ whether the patient took any chemotherapy drugs before FN. 1 = mild, 3= severe
share_room_MDR	→ whether there were any MDR patients in that same room over the previous 3 months before that patient entered room

Evaluation Criteria

- The goal is to provide an **end to end** solution that targets the **analytical** problem proposed

- Participating teams are going to be ranked based on the final score of the competition

	ANALYTICS	MEDICAL	PRESENTATION*
BEST	3 points	1 point	1 point
SECOND	2.5 points	Up to 1 point	Up to 1 point
OTHER	$S_i = (1 - \frac{A_2 - A_i}{A_2 - A_b}) \times 2.5$	Up to 1 point	Up to 1 point

Where S_i is the score of the team *i*, A_2 is the accuracy of the team with the second highest accuracy, A_i is the accuracy of team *i*, A_b is the baseline accuracy.

- First and second hackathon winners will be awarded with a prize. In case of a tie, the jury will have a final decision on the final rank

* Only the 5 teams with the highest accuracy will present their solution to the jury

Evaluation Criteria

- Teams will be evaluated based on the best prediction/model submitted using the AUC metric (higher is better).

  Remember that ROC curves plot TPR vs FPR, where:

$$TPR = \frac{TP}{TP + FN} \qquad FPR = \frac{FP}{FP + TN}$$

  - TP: True Positives
  - TN: True Negatives
  - FP: False Positives
  - FN: False Negatives

- Scoring example:

Base Line Accuracy	50,00
2ndBest solution	2,5

TEAMS	ANALYTICS		OTHER			HACKATHON
	ACCURACY	SCORE I	Medical	Presentations	SCORE II	TOTAL SCORE
Team 1	75,00	3	0,2	0,7	0,9	3,90
Team 2	65,00	2,50	1	1	2	4,50
Team 3	63,00	2,17	1	1	2	4,17
Team 4	62,00	2,00	0,2	0,3	0,5	2,50
Team 5	61,00	1,83	0,4	0,4	0,8	2,63
Team 6	57,00	1,17	0,4	0,4	0,8	1,97

Hackathon Rules

Any unprofessional behaviour will lead to the exclusion of the participant in question or even the whole team.

Amount of submissions per team: **20 submissions.**

The Evaluation Metric employed to measure and rank submissions, **AUC, will be provided in the starter R script.**

Best submission will be used to select the Analytics winning team. Please keep the code clean and tidy to facilitate its review. If you cannot provide the code that generated that winning result, we will review the second best team's code.

Public leaderboard calculated with 60% of the test data.

The usage **in the Analytics Stream of any external data or API to gather data** would lead to the **exclusion** of the team on the analytics stream.

Analytics Submissions will be made through:

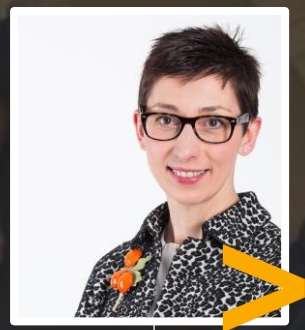
https://datathonbcn.shinyapps.io/healthhackathon18/

Prizes

- **First prize:**
  - **Nilox® Electric bike**
- **Second prize:**
  - **Polaroid® camera**

Jury Profile

JAIME RODRÍGUEZ
EALA SCA Lead



ISABEL FERNÁNDEZ
Applied Intelligence Iberia Lead

DRA. CAROLINA GARCÍA-VIDAL
Senior Specialist in Infectious diseases

DR. JOSEP MENSA PUEYO
Honored Consultant Infectious diseases services

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Organizers


Paula Andrés


Gaston Besanson


Laura Cozma


Sandra Orozco


José Mielgo


Borja Simancas


Axel Bravo


Almudena Barreiro


Delia López


Tomás Mato


Laura Gassó


Pol Giraldez


Kinga Ritter


Emily Daykin


Gabriel Soria