Solutions case study

Autumn internship at idalab 2025

Scenario

MensSana is a European chain of hospitals that also runs a number of Intensive Care Units (ICUs). MensSana turned to idalab to get support on a major challenge: Reducing the number of false alarms in ICUs with the help of AI.

ICU patients are always connected to medical devices that track their vital signs, such as blood pressure, heart rate and oxygen saturation. These devices monitor whether the vital signs are in an acceptable range. If any vital sign is out of its acceptable range, an alarm is triggered. If there is an alarm, nurses and physicians are notified and are supposed to check the condition of the patient.

However, not every alarm is relevant. Therefore, the medical devices are very sensitive and produce alarms easily (e.g., even if a sensor is just temporarily moved).

To understand how AI can help reduce the number of false alarms in ICUs, idalab's work is organized into the following workstreams:

1. Gather vital sign and alarm data from the ICU, and have a physician label which alarms are clinically relevant
2. Train various AI models using the labelled dataset
3. Assess the performance of the AI models in the specific context of MensSana

Additional information on MensSana's ICUs
- The average ICU takes care of 18 patients
- For every ICU patient, about 100 alarms are raised per day
- A false alarm needs about 2 minutes and a relevant alarm 5 minutes of a physician's time to be taken care of
- Checking on false alarms creates a lot of additional work for the ICU teams and increases the threat of missing relevant alarms

Part 1

At the beginning of the project, you are assigned to support constructing the dataset by acquiring data from one of MensSana's ICUs.

Task
Design and implement a Python program that performs the following steps:
1. Connect to the API of the hospital

2. Fetch the raw real-time vital signs continuously coming from the API
3. Transform the data so that it can be fed into a machine learning model
4. Store the data in an appropriate format

Make sure your final dataset consists of 600 unique observations. Upload your code & data using the upload link we provided via mail.

Resources
[The API](#) that exposes the vital signs.

Hint
Adhere to minimal software design standards (i.e., make sure that your code is clean and can be extended easily).

Part 2

After MensSana's ICU physicians labelled the data, your team came up with three promising AI models that are supposed to reduce false alarms. Soon, there will be one of the regular meetings with MensSana, in which you want to give them a progress update and present how our AI models are performing. From MensSana, the Head of IT (project lead on the client side), an ICU physician and the chief financial officer will attend the meeting.

Task
1. Evaluate the three AI models proposed by your colleagues using the data attached
2. Create the presentation (max. 5 slides) for the upcoming meeting with MensSana, answering the following questions:
    ● What is the challenge the ICUs at MensSana are facing?
    ● How well does our best AI model perform compared to MensSana's current patient monitoring system?
    ● What tangible impact would our AI model have if it were used today?
    ● Which next steps would you suggest for this project?

Upload your slides using the upload link we provided via email.

Resources
[Validation set with vital signs, alarms of the current monitoring system and the predictions of the three proposed AI models.](#)

Column	Description
heart_rate	Heart rate
respiratory_rate	Respiratory rate

Column	Description
blood_oxygen_saturation	Oxygen saturation measured via pulse oximetry
systolic_blood_pressue	Systolic blood pressure (non-invasive)
diastolic_blood_pressue	Diastolic blood pressure (non-invasive)
medical_emergency	Whether the patient was experiencing a medical emergency (and needed immediate medical attention)
monitor_alarm	Whether the patient's monitoring device triggered an alarm (Current monitoring system deployed at MensSana)
ai_model1_alarm_probability	Predicted probability of the patient experiencing a medical emergency (AI model 1)
ai_model2_alarm_probability	Predicted probability of the patient experiencing a medical emergency (AI model 2)
ai_model3_alarm_probability	Predicted probability of the patient experiencing a medical emergency (AI model 3)

Hints
- Keep in mind the audience you will present to and prepare your slides accordingly
- Please refrain from creating any new AI models and use the provided AI models instead
- You can use whatever tools you like to evaluate the AI models
- You don't need to share your detailed model evaluation with us; it is enough to include the parts that are relevant to the audience in your presentation