Success Stories
ADLIFE

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European Commission | Horizon 2020 European Union funding for Research & Innovation

AI & ML Services

Client	Industry	Country
H2020 EU	Public Sector / Health	Spain

TECHNOLOGIES LEVERAGED

-Tensorflow & Keras   -Docker   -Pandas

HISTORY OF TRANSFORMATION

The European Union focused great part of its research and innovation activities in the Program called Horizon 2020 (H2020). It has contributed to addressing major societal challenges, promoting industrial leadership in Europe and strengthening the excellence of its science base.

Among the strategic objectives set by the H2020 program, the research aimed at solving specific problems of citizens is highlighted, such as healthcare and the aging of society.

CLIENT CHALLENGE

The way medical data is collected makes it a challenge for training and developing ML models. The information available is not data-driven, meaning that the project was dealing with data sparsity, which translates into inconsistent and extremely low-quality data. As a result, a considerable amount of data processing will be needed. Moreover, advances in the field of AI and Big Data are driven by the availability of a large amount of data, most of which contains sensitive information, protected by privacy regulations such as GDPR. This makes it impossible to share the data, preventing models from being trained. Making it essential to overcome this data access boundary in order to develop the project.

SOLUTION OVERVIEW

A microservice integrating six predictive models was defined. Each model is related to a different pathology, such as depression, anxiety, hypotension, malnutrition, readmission, and avoidable admission, and trained independently. The main objective was to extract data from different pilots (hospitals), CSV files, and use them to train and calculate the risk of the models.

More specifically, the use case led NTT DATA consists of training a model, simulating a network of three hospitals, that performs the classification of lung radiographs into different classes. The objective of the PoC is to analyze in a practical way the advantages and limitations of a use case in terms of scalability and performance.

BUSINESS VALUE & KPIS

• Successfully integrate therapies and approaches which target early detection and assessment of deterioration.
• Facilitate advanced and well-coordinated care planning and integrated supportive care to enhance the quality of life, reduce suffering and accelerate recovery for patients and their families.
• Provide a Personalized Care Plan Management Platform.
• Provide Clinical Decision Support Services with Interoperable Solutions.
• Build a Patient Empowerment Platform with Just-In-Time Adaptive Intervention Delivery Engine.
• A consistent and high-quality database that can be used efficiently in the construction and training of predictive models.

⚙ TECHNICAL SPECIFICATIONS

Adlife proposes a new form of patient care based on two platforms Patient Empowerment Platform for the patient and ADLIFE PCP Platform for physicians and doctors. For this second platform, NTT DATA is leading the development of a network of federated predictive models for clinical decision support.

These models consist of LSTM (Long Short-Term Memory) architectures and are trained using EHR (Electronic Health Records), which consist of large amounts of historical indicators (demographic, laboratory, survey, old admissions…).

Once trained, the models are able to predict the probability of different chronic pathologies (malnutrition, hypotension, depression…) as well as patient readmissions and avoidable admissions.
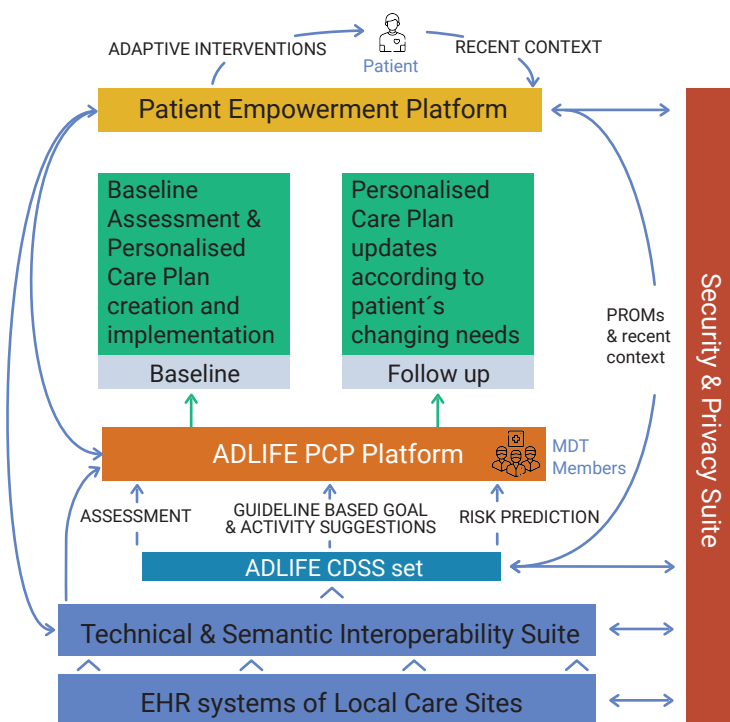
DATASET:

A preliminary analysis of raw data was completed, resulting in the conclusion that a more comprehensive study of variable status and data quality was required.
Following the analysis results, all necessary transformations were performed in order to improve data quality and build a consistent database for training and developing accurate predictive models.

SOLUTION ARCHITECTURE
Model Architecture:
The model is based on an LSTM approach. An LSTM layer is set to predict the sequences fed from the preprocessed dataset. On top of this, an attention layer was inserted inside this model to try and mitigate the effects of high sparsity present on the dataset.

Microservice Architecture:
The inference service will interpret FHIR data, which will be treated as a JSON. This data will be properly transformed and placed in a data frame and then will be fed to the model. The model will perform inference on the data given and the result will be expressed as a probability. This solution is all encapsulated inside a Docker container.

KEY TAKE AWAY
As a result of the solution implemented, NTT DATA will collaborate in the publication of four research publications, by providing its technical expertise and know-how.

"This project seeks to improve the overall quality of life of patients, because if doctors have all this information, they will have a better follow-up of the patient, as well as relieve overcrowding or unburden the congestion of the medical system." Miguel Roldan Ezponda, Project Leader – NTT DATA