



ARTIFICIAL INTELLIGENCE

The new clustering algorithm developed by SAILENDRA recognized at the UMAP 2017 conference

- The work of Charif HAYDAR, a researcher at SAILENDRA and Professor Anne BOYER, a founding member of SAILENDRA and professor at LORIA laboratory (*Laboratoire Lorrain de Recherche en Informatique et ses Applications*) of the University of Lorraine, was recognized at the UMAP 2017 conference held in Bratislava (Slovakia) from 9 to 12 July 2017.
- UMAP (User Modelling, Adaptation and Personalization) is the premier international conference for researchers and practitioners throughout the world working on recommender systems and artificial intelligence.
- The title of the article published was: "*A New Statistical Density Clustering Algorithm based on Mutual Vote and Subjective Logic Applied to Recommender Systems*".
- The publication of this article in the conference proceedings constitutes major recognition by the international scientific community of the research work spearheaded by the SAILENDRA scientific team.
- SAILENDRA is a subsidiary of PHARMAGEST Group (Euronext Paris #FR 0012882389 – PHA.PA).

Clustering: the heart of the system

Clustering is a central issue for machine learning and artificial intelligence. Clustering represents a procedure for arranging objects in groups (clusters) and assigning labels to clusters to make them meaningful. Computers are capable, throughout a machine-learning programme, to cluster users according to their behaviour, and find appropriate labels to these clusters. As the number of users increases, and the quantity of information by user decreases, users become more diverse and the problem is more difficult.

For that reason, SAILENDRA decided to develop a new clustering algorithm capable of managing this problematic using subjective logic, itself is an extension of probabilistic logic.

A unique algorithm based on subjective logic in the recommender and prediction systems

At this conference, Charif HAYDAR unveiled a new clustering algorithm based on the mutual vote, which adjusts itself automatically to the dataset, demands a minimum of parameterizing, and is able to detect clusters with different density at a time.

This algorithm, named MUTUAL VOTES, was tested and compared to many existing clustering algorithms on clustering users in a recommender system context. And this comparison was decisive: the algorithm adjusts itself automatically to the typology of the data in high dimensional spaces, and needs no parameterization.

Validated with a real dataset

MUTUAL VOTES' performance was demonstrated using a real dataset:

for sales of the company J.MILLIET, a distributor of beverages to professionals in the restaurant sector and the retail market. The performances of SAILENDRA's algorithm were then compared to other clustering algorithms in terms of labelling clusters quality and prediction of users' purchases. Results demonstrated the advantages of the algorithm developed by SAILENDRA, especially in terms of prediction.

Prospects: SAILENDRA's technological events will directly benefit to its customers

The algorithms developed in the framework of UMAP 2017 will make it possible to further enhance the recommendations proposed by the SAILENDRA system.

This innovation will in particular improve the effectiveness of the technological offering developed by SAILENDRA and enable it to offer fine-tuned and automatic clustering to its customers in order to:

- further increase the rate of sales growth generated;
- provide greater precision and clustering in order to define consumer categories with considerable effectiveness;
- offer a thorough knowledge of the customer base through a very precise definition and labelling of their common interests which will then make it possible to more precisely address the desires and needs of each consumer.
- in summary, it will offer an increase in the rate of confidence and satisfaction of consumers for the customer.

For Régis LHOSTE, Chair and Founder of SAILENDRA: *"We are very proud that the research work of Charif HAYDAR and Anne BOYER was recognized by the jury of UMAP 2017, a leading scientific conference. For us, this represents a very prestigious recognition by the scientific community that will contribute significantly to the notoriety of the research carried out at SAILENDRA. The data collected by or for companies has today become a major priority. The information, and all unexploited information within the enormous volumes of data, has become for these companies a major factor for competitiveness and innovation. Today we have demonstrated that our new algorithm has surpassed existing algorithms in terms of both precision and prediction; These results are encouraging and we are currently testing our algorithm on other types of data, in particular larger datasets in order to demonstrate its scalability.*

PHARMAGEST INTERACTIVE's upcoming financial publications:

- Publication of 2017 H1 revenue: 10 August 2017.
- Publication of 2017 H1 results: 22 September 2017.

About SAILENDRA - www.sailendra.fr

SAILENDRA, a 70%-owned subsidiary of PHARMAGEST Group, is a young French company originating from the world of research. It combines complementary high-level areas of expertise. It designs and develops artificial intelligence-based purchase optimisation solutions for e-commerce, the healthcare sector and e-learning. SAILENDRA proposes in particular Sailsense, a behavioural analysis solution capable of proposing personalized recommendations for e-commerce to boost sales and customer retention.

About PHARMAGEST Group:

PHARMAGEST Group is the French pharmacy information technology leader, with a 43.5% market share and more than 900 employees. The Group's strategy is based on a core business of improving healthcare through information technology innovation and developing two priority areas: 1/ Services and technologies for healthcare professionals, with a focus on assisting pharmacies in the area of patient medication compliance; and 2/ technologies for improving the efficacy of healthcare systems.

To roll out that strategy, PHARMAGEST Group has developed specialised businesses, including pharmacy IT, e-Health solutions, solutions for healthcare professionals, solutions for pharmaceutical laboratories, connected health devices and apps, and a sales financing marketplace.

These businesses are now divided into four divisions: The Solutions for Pharmacy Division – Europe, the Solutions for Health and Social Care Facilities Division, the Solutions for e-Health Division, and the FinTech Division.

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