



ORGANIZATION



Sociedad de Tasación
www.st-tasacion.es

ORGANIZATION SIZE

200 employees & 700 independent appraisers

COUNTRY/REGION

Spain

INDUSTRY

Real Estate and Finance

BUSINESS NEED

Gaining Real Estate Valuation Accuracy & Precision
through Artificial Intelligence-based AVMs

THE CUSTOMER

Sociedad de Tasación is an organization which works in the field of asset valuation -particularly real estate properties. Sociedad de Tasación was the first authorized real estate valuation company, according to the guidelines of the Bank of Spain, in 1982. Throughout these years Sociedad de Tasación has gathered an experience of close to 4 million real estate valuation reports performed; over 3 million AVMs (real estate automated valuations); and more than 4 million of market data audited. From the business point of view, Sociedad de Tasación is the second most important real estate valuation company in Spain regarding yearly turnover.

THE NEED

Despite enjoying a solid statistics-based automated valuation model (AVM) and after having already experienced the impressive performance of the AI technology applied to the valuation industry through [the previously developed project by hAltta](#), Sociedad de Tasación wanted on the one hand to improve its already high precision levels regarding automated valuation models upon using again artificial intelligence; and on the other hand to provide its Market Department with cutting-edge AI-based AVMs to better and optimize its work.

THE SOLUTION

In December 2017 Sociedad de Tasación and hAltta launched jointly another AI project: this time to apply machine learning techniques to the real estate automated valuation realm.

The project was developed in several phases:

1. *Data loading*: Defining the data structure and format, names, and features.
2. *Data wrangling*: Data processing to make them adequate for the AI models developed.
3. *Data analysis*: Jupyter NoteBooks generation which summarized the problem, the several approaches followed and tested, the data available, the volume of them, etc.
4. *Feature engineering*: From the existing variables, generating new features to feed the AI models to enrich the information model.

5. *Machine Learning*: As the problem unfolded and hAltta team delved into it, the approach was evolving and changing. Initially the view was to test several machine learning algorithms, with a reduced feature sub-set, to gain more knowledge about the nature of the problem. The best results were achieved using boosting techniques for regression.

Once defined a base line through the aforementioned method, different approaches were followed to dig into this view; namely: including new features, substituting or modifying the already existing ones; focussing the problem on particular aspects such as the appraiser, the zip code, the city or town, etc. Throughout the project development some dimension reduction techniques were proposed to strive for simplifying the problem and setting up new approaches. PCA and Autoencoders techniques were eventually employed: the achieved results showed there were still pending features and aspects of the problem to be considered and not including them impacted negatively on the final results.

All these testing and knowledge acquisition allowed hAltta to produce for Sociedad de Tasación the adequate AI-based AVM framework which could grant the organization the initially pursued added value.

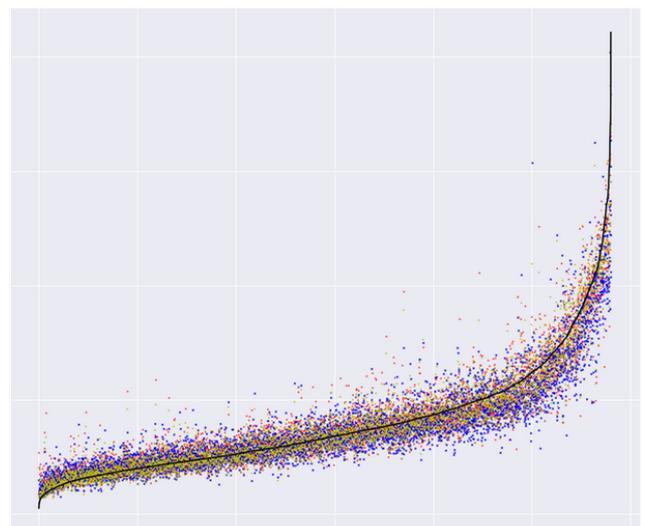


Fig. 1.- Proposed model comparison plotting.

THE BENEFITS

Sociedad de Tasación has harvested several benefits from this AI-based AVM framework development; namely:

- ✓ Through the combination of the existing statistics-based AVM and the new AI-based AVM framework, Sociedad de Tasación real estate valuation accuracy and efficiency levels have rocketed.
- ✓ This improvement has been mirrored as well in the Market Department: adding up to [the previously developed optimization project by hAltta](#), this department is enjoying as well this cutting-edge AI-based AVM framework to perform a much better labor.
- ✓ The whole process of generating the AI-based AVM framework has been used to improve the data quality and spot likely mistakes.
- ✓ On top of that, these sophisticated AI modeling techniques have granted Sociedad de Tasación as well -in an automated and, hence, entirely objective manner- a confidence level for each valuation result, thus providing the organization managers with an indication of accuracy at a property-by-property level, and allowing them to achieve much greater granularity in their models than with any previous approach.

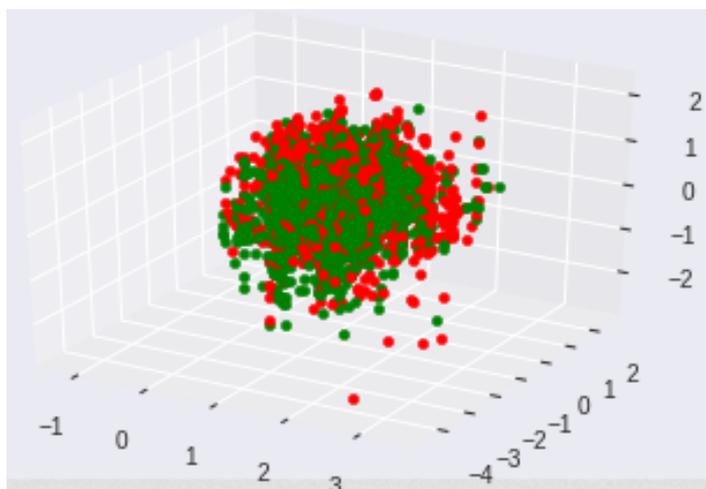


Fig. 2.- Discrete error analysis using Autoencoders as dimensionality reduction approach.

TECHNICAL INFORMATION



hAltta used the so-called ‘Python Data Science Toolkit’, which is formed by open source tools and libraries such as:

- Numpy
- SciPy
- Pandas
- ScikitLearn
- Bokeh
- MatPlotLib
- SeaBorn
- ...



Experiments and visualizations were shown to the client in early stages, using Jupyter Notebooks.

For source code versioning purposes, hAltta made use of private Git repositories.

There were no special needs for infrastructure in order to run experiments or to operationalize the model in this project.

In the implementation phase of the model, hAltta developed an API -Flask + Gunicorn + Nginx- to allow ST to query the framework and integrate it into its current application.

“Already knowing hAltta skills and abilities, in this second collaboration in the realm of artificial intelligence we requested hAltta to work jointly with our teams in the area of Automated Valuation Models (AVM). The developments carried out enabled Sociedad de Tasación to clearly improve the model accuracy and to achieve the established targets. This common work with hAltta has allowed us to obtain ideas from another angle regarding our valuation processes, and to enhance our knowledge concerning not only obtaining certain ideas about our valuation operations from another perspective, but also harvesting some enriching views on the PropTech industry.”

Gustavo Fernández Calvo.
Operations Director at Sociedad de Tasación