Algorithm Engineering Group
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Bachelor Project 2021/22

Hasso Plattner Institut
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valyria

Next Generation Real-Estate Valuation

Background and Challenge. Real-estate business is booming. In the first quarter in 2021 alone the volume of transaction was about 10.2 billion EUR in Germany.[1] On the other hand, climate protection is one of our biggest issues, and, worldwide, emissions of buildings are responsible for 38% of the carbon dioxide output. Hence, so called green buildings are becoming increasingly more important.[2] In a first step, we therefore want to figure out the relevant energy-oriented refurbishment factors driving the price.

Furthermore, for each real estate being sold the right buyer has to be found. Unfortunately, this still need involves a number of manual tasks. Therefore it is an interesting and challenging algorithmic problem to tackle.

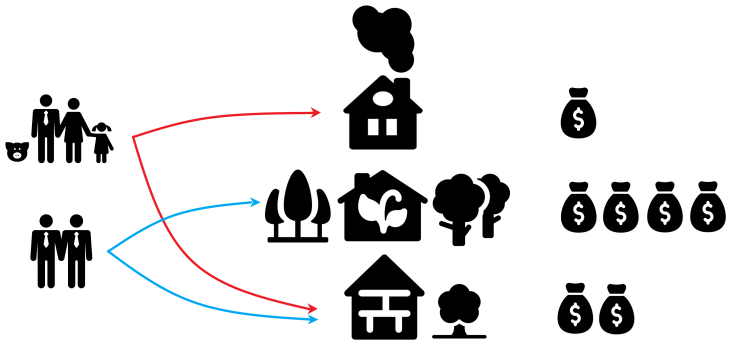
Despite the increased number on PropTech-Startups, digital solutions establish themselves just slowly. In cooperation with Valyria Technology GmbH (Valyria), we seek to push innovation capacity. In particular, we want to understand how energy efficiency and an increase in the value of a real estate involve each other. Furthermore, knowing the needs profile of the possible buyers on the one hand and having the property characteristics on the other hand, we then want to find suitable buyers for the properties.

Vision. Given millions of real-estate valuation data and scientific freedom, we aim to enhance the current valuation process and tie in at several points.

As the core goal of the project, we want to investigate and understand the influence of environmental, social and corporate governance (ESG) criteria. In particular with respect to the climate crisis and sustainability we want to figure out which factors are driving the price. Furthermore, we want to understand how ESG criteria change the forecast regarding the price development.

Secondly, only the offers that are most relevant to interested buyers and sellers should be suggested. To this end a conception of a matching algorithm is necessary which maps interested buyers to fitting objects. In a first step it is important to determine the relevant factors influencing the decision. Afterwards, the right matching has to be found.

1 https://www.realestate.bnpparibas.de/marktberichte/investmentmarkt/deutschland-at-a-glance
2 https://www.realestate.bnpparibas.de/marktberichte/investmentmarkt/deutschland-market-focus



Outline of the project setup. Given the real-estate valuation data, the goal is on the one hand to analyze which ESG factors are driving the price and on the other hand to match suitable buyers and sellers.

Industry Partner Contribution. Valyria Technology GmbH (Valyria)[3] founded in 2020 by experienced entrepreneurs is a PropTech-Startup with focus on digital transactions of apartment buildings. Valyria is the first real estate platform to make the entire transaction process fully digital. Instead of the subjective assessments of real estate agents, there are objective data-based quality and price evaluations. The service ranges from the digitization of the documents and the automated valuation of the property to a digital financing calculator. A price forecast that is as exact as possible is at the core of our project.

Our Contribution. We work closely with you and provide expertise in algorithm engineering, structural and empirical analysis, as well as big data analysis and visualization. We also guide you into understanding real estate economics and relevant theoretical models. We support you in developing the necessary tools and artifacts for creating software interfaces, analyzing the data and creating visualizations. Furthermore, before starting your Bachelor thesis we offer for you a workshop about scientific writing. As in previous projects, we then plan to write a joint scientific publication about our research findings.

Your Contribution. Working in a team, you analyze the provided data, come up with different methods of valuating real estate with respect to ESG criteria, develop a suitable matching algorithm, and create a tool that displays your results. Supported by us, you learn how to manage a team and approach challenging tasks that are unsolved so far. Having an interest in solving novel problems as well as joy in developing a software system that you help shape are very welcome. We are looking forward to working with you.

Cooperation Project. The bachelor project is offered by the Algorithm Engineering group in cooperation with Valyria. The cooperation is based on a joint project. As the data is confidential, you will have to sign a non disclosure agreement.

Supervisors.

HPI

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3 https://valyria.de/