Chair of Financial Management and Capital Markets
TUM School of Management
Technical University of Munich

NLP and firm innovation: Analysis of patents in international stock markets

Keywords: Natural Language Processing, Machine Learning in Finance, Textual analysis

Project description

Firms invest a substantial amount of resources to research and development (R&D) of new products, services and brands. These innovations can be protected, which give the owner the legal rights to exclude others from making, using, or selling an invention for a given time-period in exchange for publishing a patent of the invention. As such, patenting novel innovations can lead to an increased firm performance and strong market positions. This information can be used by investors, to assess the future performance of a company, without being reliant on firm reports and future sales. However, with over 100 million granted patents, investors are unable to process this information and make an informed decision on the novelty of a patent.

With the emergence of Natural Language Processing (NLP) analyzing large quantities of text data has become feasible. Breitung and Müller (2023) show the benefits of using NLP compared to traditional methods. Furthermore Kelly et al. (2021) use NLP to analyze patent descriptions in the U.S and find a positive relationship between novelty and firm performance.

In this project, the student will process the information presented in patent descriptions. To do so, the student will first match information of patent assignees to the information in common stock market databases. In the next stage, the descriptions can be compared and analyzed to see if the information content is different to existing patents. Here, the student will develop a method to price the firms innovation and analyze the effect of the granted patents. After developing the metric, it can be compared to other measures of innovation like R&D expenses, number of patents etc.

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What we are looking for

- Strong analytical and project management skills
- Determination and passion for your areas of expertise
- Good Python programming skills
- Interest to work at the intersection of finance and IT
- 1 or 2 persons

What we offer

- Knowledge in quantitative finance, corporate finance and machine learning
- Kick-off session including introduction to relevant finance and/or business topics
- Experience with IDPs
- Open dialogue and support
- Access to prime capital markets databases (Bloomberg, Datastream, Thomson Reuters, etc)
- Potential for publication and/or evaluation of future use cases
- Both single and group projects are possible

Interested?

Please send an e-mail with CV, academic transcript and your preference for this project to sebastian.mueller.hn@tum.de

Questions?

In case of any (e.g. topic related) questions, please contact Sebastian Müller (sebastian.mueller.hn@tum.de)

References

Kelly, Bryan, Papanikolaou, Dimitris,Seru, Amit and Taddy, Matt (2021). “Measuring technological innovation over the long run“ In American Economic Review , (3), p. 303-320.

Breitung, Christian, and Sebastian Müller. "New Information Detection using Language Models" *Available at SSRN* (2023).