We are looking for a PhD Candidate within data driven stochastic optimization for natural gas

PhD position - Data driven stochastic optimization for natural gas

This is NTNU
At NTNU, creating knowledge for a better world is the vision that unites our 7 400 employees and 42 000 students.

We are looking for dedicated employees to join us.

Video: https://www.youtube.com/watch?v=cIgKd1SwGLI

About the position
There is a temporary 3 year PhD Candidate position available at the Department of Industrial Economics and Technology Management - Section Managerial Economics, Finance and Operation Research. The position is resident at NTNUs campus in Trondheim. This is an educational position, which will provide promising research recruits the opportunity for professional development through studies towards a PhD-degree. The position is connected to the PhD program at the Faculty of Economics and Management and the faculty will be your employer.

Information about the Department of Industrial Economics and Technology Management:

The department is organized into six sections:

- Managerial Economics, Finance and Operations Research
- Health, Safety and Environment Management
- Strategy and Business Development
- Operations Management
- Experts in Teamwork
- Section of Economics and management (Campus Gjøvik)

The researcher will be a part of BRU21: NTNU Research and Innovation Program on Digital and Automation Solutions for the Oil and Gas Industry (www.ntnu.edu/bru21). BRU21 is a PhD driven Program with about 30 PhD/PostDoc projects led by 25 Professors from different institutes at NTNU, as well as a number of industrial co-supervisors.

The PhD candidates are financed either by NTNU or by an Oil and Gas Company. This specific PhD position is financed by Gassco, and the PhD candidate will work on a use case in collaboration with Gassco.

About the project
This position is in optimization and operations research. The project will develop models and solution methods for short-term optimization of natural gas pipeline transport and compressor management focusing on trade-offs between energy efficiency, CO_2 emissions and economic values of flexibility. In addition to new models, this requires advanced stochastic optimization techniques and data driven optimization. Machine learning and/or scenario generation techniques will play an important role in the project.

As an increasing amount of natural gas is sold in short-term markets, also the shippers of natural gas have incentives to change directions of gas flows toward the hubs with the highest price. With a higher renewable share in the European energy markets, the flexibility in the natural gas system and the ability to adjust production in swing fields may in the future have a high commercial value. This is a service that can be provided both to shippers and buyers. On the other hand, there is an increased interest in reducing the CO_2 footprint of oil and gas production, including reducing the compression power. This can be done using stochastic programming in more advanced compressor management, considering the optimal scheduling for security of supply and for commercial use.

Another aspect of the project is a combination of data driven optimization and machine learning to dynamically manage faults detection and responses. This is related to the model-based approach described above but has a higher focus on machine learning for prediction and links to model-based linepack optimization. Methodological challenges are:

- Better representation of compressors in the optimization models and solution methods to handle these
- Better representation of the linepack in dynamic models, both in multiperiod steady- state models and transient-based optimization models
- Optimization of the tradeoffs between commercial use and security supply aspects of linepack including also energy efficiency considerations to reduce the CO_2 footprint.
- Prediction models based on time series and/or machine learning for both events in the network (fault situations, events) and outside (nominations)

You will report to your supervisor.

Required selection criteria
- The PhD-position's main objective is to qualify for work in research positions. The qualification requirement is that you have completed a master's degree or second degree (equivalent to 120 credits) with a strong academic background in operations research and optimization or equivalent education with a grade of B or better in terms of NTNU's grading scale.
- The position requires excellent English oral and writing skills. Some Scandinavian language skills would be preferable.

In addition, the following qualifications will contribute positively to the evaluation of the applicant:

- Background and/or experience relevant to the project topic (see the project topic)
- Documented experience with stochastic optimization
- Good knowledge of digital tools like Matlab, Python, etc.
- Documented experience with data analytics technics (e.g. machine learning, artificial intelligence)
- Industrial experience

Personal characteristics
- High level of personal responsibility and initiative
- Ability to work independently as well as part of a team in accordance with the project objectives
- Ability to work in interdisciplinary projects and teams
- Suitable candidates should have good communication skills, be flexible and solution-oriented

In the evaluation of which candidate is best qualified, emphasis will be placed on education, experience and personal suitability, in terms of the qualification requirements specified in the advertisement.

We offer
- Exciting and stimulating tasks in a strong international academic environment
- An open and inclusive work environment with dedicated colleagues
- Favourable terms in the Norwegian Public Service Pension Fund
- Employee benefits

The city of Trondheim is a modern European city with a rich cultural scene. Trondheim is the innovation capital of Norway with a population of 200,000. The Norwegian welfare state, including healthcare, schools, kindergartens and overall equality, is probably the best of its kind in the world. Professional subsidized day-care for children is easily available. Furthermore, Trondheim offers great opportunities for education (including international schools) and possibilities to enjoy nature, culture and family life and has low crime rates and clean air quality.

Salary and conditions
PhD candidates are remunerated in code 1017, remunerated at gross NOK 482 200,- per annum before tax. From the salary, 2% is deducted as a contribution to the Norwegian Public Service Pension Fund.

The period of employment is 3 years without required teaching duties. The position is connected to the PhD program at the Faculty of Economics and Management and the faculty will be your employer. Appointment to a PhD position requires admission to the PhD program in Economics and Management, program option Industrial Economics and Technology Management, and your work place will be at the Department of Industrial Economics and Technology Management (https://www.ntnu.no/iot).

As a PhD candidate, you undertake to participate in an organized PhD program during the employment period. A condition of appointment is that you are in fact qualified for admission to the PhD program within three months.

The appointment is to be made in accordance with the regulations in force concerning State Employees and Civil Servants and national guidelines for appointment as PhD, post doctor and research assistant, as well as the acts relating to Control of the Export of Strategic Goods, Services and Technology.
Candidates who by assessment of the application and attachment are seen to conflict with the criteria in the latter law will be prohibited from recruitment to NTNU.

After the appointment you must assume that there may be changes in the area of work.

Incomplete applications will not be considered.

Appointment takes place on the terms that apply to State employees at any time, and after the appointment you must assume that there may be changes in the area of work.

Primary residency in Trondheim is a prerequisite.

About the application
The application must include:

1) Application letter concerning your motivation for completing a PhD

2) A short project proposal (maximum 2 pages) describing thematically problems, theories, methods and means linked to one of the topics/areas that the positions target.

3) A CV with information on education, previous research experience, together with authorized documentation of certificates and study records.

4)   Academic work (not master thesis). Joint work will be evaluated. If it is difficult to identify the contributions from individuals in a joint piece of work, applicants should enclose a short descriptive summary of what she/he contributed to the work.

5)   2 References

Publications and other academic works that the applicant would like to be considered in the evaluation must accompany the application.

Please submit your application electronically via jobbnorge.no with your CV, diplomas and certificates.

General information
Working at NTNU

NTNU is committed to following evaluation criteria for research quality according to The San Francisco Declaration on Research Assessment - DORA.

A good work environment is characterized by diversity. We encourage qualified candidates to apply, regardless of their gender, functional capacity or cultural background.

Under the Freedom of Information Act (Offentleglova), information about the applicant may be made public even if the applicant has requested not to have their name entered on the list of applicants.

Questions about the position can be directed to Professor Asgeir Tomasgard, email Asgeir.tomasgard@ntnu.no / phone 00 47 930 58 771.

Application deadline: June 6th 2021.

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The Norwegian University of Science and Technology (NTNU) creates knowledge for a better world and solutions that can change everyday life.

Department of Industrial Economics and Technology Management

We conduct research and teaching at an international level in the interface between technology/natural sciences and economics, management, and HSE (health, safety and the environment). Our goal is sustainable creation of value within technology-based areas in industry, business and the public sector in Norway. We have academic groups in Trondheim and Gjøvik. The Department of Industrial Economics and Technology Management is one of four departments in the Faculty of Economics and Management.

Jobbnorge-ID: 206100, Søknadsfrist: 6. juni 2021