GRADUATION ASSIGNMENT:

Benchmark a novel method for diagnostics and predictive maintenance

Background information

The complex machines made by ASML produce enormous amounts of data. Some of it might actually contain information about failures and deviations in the system’s behaviour. The first challenge of diagnostics is to actually narrow down the list of data to look at. We could call this a reduction of the search space. ASML is focusing more and more on big data type of approaches. Some of these approaches require a lot of computational resources (e.g. machine learning). Information theory based approaches seem to be more promising in terms of computational power required and the involvement of domain experts. A novel method for diagnostics and predictive maintenance was invented at ASML. We want to benchmark to another potential method for causal inference using time series: dynamic Bayesian networks.

Your assignment

Your assignment will be to learn to use the novel method for causal analysis, possibly contributing to the aspect of causal reasoning:

- Model several failures on ASML’s lithography machines with DBN’s for comparison.
- Determine what class of failures can be identified with DBN’s.
- Compare same failures with our current method.

Conclusions must be made on:

- Type of failures that can be identified;
- Sensitivity of method for limitations in observability;
- Computational requirements: scalability of method;
- Required domain knowledge;
- Required steps towards predictive capabilities (in time).

Your profile

You are a master student in Applied Mathematics or a related discipline, with knowledge of information theory and Bayesian networks. Experience with Matlab is required. Furthermore, your English communication skills are excellent.

This is a graduation internship for 5 days a week with duration of a minimum of 6 months.

What ASML offers

Your internship will be in one of the leading Dutch corporations, gaining valuable experience in a highly dynamic environment. You will receive a monthly internship allowance of 500 euro (maximum), plus a possible housing or travel allowance. In addition, you’ll get expert, practical guidance and the chance to work in and experience a dynamic, innovative team environment.

ASML: Be part of progress

We make machines that make chips – the hearts of the devices that keep us informed, entertained and safe; that improve our quality of life and help to tackle the world’s toughest problems.

We build some of the most amazing machines that you will ever see, and the software to run them. Never satisfied, we measure our performance in units that begin with pico or nano.

We believe we can always do better. We believe the winning idea can come from anyone. We love what we do – not because it’s easy, but because it’s hard.

Students: Getting ready for real-world R&D

Pushing technology further is teamwork, and our R&D team is more than 5,500 people strong, with major sites on three continents. Dozens of diverse, interdisciplinary teams work in parallel to meet a challenging development schedule.

In such an environment, your colleagues may be sitting next door, or they could be thousands of kilometers away in a different country, or even working for a different company.

An internship at ASML is your opportunity to get to know this world of industrial-strength R&D and get a feel for that excites you most. Will you design a part of the machine, or make sure it gets built to the tightest possible specifications? Will you write software that drives the system to its best performance, or work side-by-side with the engineers of our customers in a fab, optimizing a system to the requirements of the customer?

How will you be part of progress?

Field: Applied Mathematics
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