



Characterization of nanoparticles using machine learning

Internship

Extracellular vesicles (EVs) are nanoparticles released by the cells and are present in all body fluids. EVs have the potential to be a biomarker to distinguish between healthy and non-healthy individuals. EVs measurements are generally performed using Mie theory which, given the properties of the particle (e.g., radius and refractive index), determines how the scattering pattern will be when the particle is hit by a laser of given properties (e.g., wavelength).

In a measurement setup the challenge is to solve the inverse problem, i.e., given the scattering pattern determine the radius and refractive index of the particle that generated it. The inverse problem is ill-posed and the objective of this project is to solve it using machine learning (ML). The candidate will

- curate the generation of synthetic data (to be as similar as possible to the image collected in the lab) using a code available at the institute solving the forward problem
- use the synthetic data to train a ML algorithm solving the inverse problem
- add an uncertainty estimation associated to the prediction of the ML predictions
- test the developed algorithm on experimental data

The work will be carried out at VSL – National Metrology Institute (Delft) within the Data Science and Modelling group and in collaboration with the Length group. The developed algorithm will be integrated into a current experimental facility, therefore its performance and limitations need to be assessed and validated. The ideal candidate would thus have a good understanding of statistics and ML, and is familiar with programming in Python.

If you are interested in ML, image processing and metrology, and would like to know more about R&D projects for healthcare, this internship is a perfect opportunity. For further questions about the project, please do not hesitate to contact Federica Gugole (fgugole@vsl.nl) scientist in the Data Science and Modelling group or Martine Kuiper (m.w.kuiper@amsterdamumc.nl) scientist Length and Optics. If you are interested and will apply, please send your CV and motivation letter to Lydia de Koning (ldekoning@vsl.nl), HR business partner.