I'm primarily interested in the fundamental, methodological and practical aspects of learning statistical models from data. Luckily, I have also found an application for these models that attracted me since very little and for which my country (Chile) is famous: Astronomy. Nowadays most of **my personal research falls under the relatively new field of Astroinformatics, a combination between astronomy, data science and machine learning. In particular I'm focused on the development of new methods to automatically analyze astronomical data**, and I'm interested in the scenario posed by near-future synoptic surveys such as the LSST, which will stream several terabytes of data every night. For a complete list of publications please see my full CV at `http://phuijse.github.io`. In what follows I'll summarize my research experience, my current projects and my plans for the future.

During my doctoral studies I worked at the Computational Intelligence laboratory (Universidad de Chile), in charge of Prof. Dr. Pablo A Estévez, developing methods to automatically analyze large volumes of astronomical time series or light curves. Because light curves are irregularly sampled, sparse and noisy (among other challenges), new methods were needed in order to extract relevant information effectively and efficiently. **To develop these methods I specialized myself in statistical signal processing, information theory, machine learning and later deep learning. I also had to learn practical aspects about data handling, exploration and visualization.** I studied these subjects directly from world experts thanks to two government-funded scholarships for doctoral internships in 2012 and 2013, respectively. In 2012 I spent 8 months at the Institute for Applied Computational Sciences (IACS) at Harvard University, under Prof. Dr. Pavlos Protopapas, where we worked on processing the EROS-2 survey. Then in 2013 I spent 8 months at the Computational Neuro-Engineering Laboratory (CNEL) at the University of Florida, under Prof. Dr. José Principe, where we worked on the fundamental limits of the information theoretic methods I've been implementing.

After graduating as Doctor in Electrical Engineering from U. de Chile (2014) I started a government-funded postdoc at the Millennium Institute of Astrophysics (MAS). During my time as a postdoc (2015-2017) I collaborated directly with astronomers expanding considerably in the practical aspects of dealing with different types of astronomical data (optical, infrared, xray, time series, images, streams). Nowadays I participate at MAS as a young researcher where I continue to collaborate with astronomers and computer scientists in challenging data-related astronomical problems. One particularly important project is the Automatic Learning for the Rapid Classification of Events (ALeRCE), an astronomical broker built within this collaboration and the only one of its kind in the southern hemisphere. ALeRCE is connected to the stream of large etendue telescopes, processes the data in real-time using machine learning methods and outputs the results to the astronomical community. **My job in the ALeRCE project is to develop models for analysis and classification of astronomical images and light curves. The libraries and tools that we have developed are open-source and freely available to the community.**

In 2018 I joined Universidad Austral de Chile (UACh) as an assistant professor and during this time I was awarded with two government-funded research grants titled "Efficient methods based on information theory and machine learning for astronomical images and time series analysis" (2017-2020) and "Novel deep learning architectures for astronomical time series" (2021-2023), respectively. For the former I focused on developing methods for synoptic surveys, i.e. the goal of the ALeRCE broker. This included methods for detecting periodic behavior in light curves (ApJ 2018), learning representations and classifyng transient astronomical objects from images and images sequences (ESSANN 2018; IJCNN 2018; PASP 2019), and also new generative-inference models for images (ECCV 2020)

In the latter project I'm researching neural networks that take into account the intrinsic characteristics of light curves at an architectural level. A secondary objective of this project is to quantify the uncertainty on the predictions of such models, and use this information to decide whether or not a target is an outlier that should be further investigated (or followed-up). To achieve this I've been studying the intersection of bayesian modeling and deep learning, and in particular how to implement and train this kind of model effectively. I would be elated to continue developing the ideas of this ongoing project if my application is considered.

Astronomy has proven to be a fertile ground to develop and test novel computational methods. Thanks to the excellent scientific network at MAS I have not only first-hand access to astronomical data but also the expertise of world-class astronomers and astrophysicists. Participating on the ALeRCE project has been a very fruitful experience but there are still plenty of unsolved challenges. I'm eager to continue contributing to this project through my own research and also by coordinating and supervising final-year projects and thesis. I will also remain open to new collaborations that may benefit from my expertise. **Collaboration between astronomers, computer scientists, data scientists and engineers is key to solve the near-future astroinformatics challenges.**

Other activities not related to astroinformatics:

- FUSA system: In 2021-2022 I was part of a government-funded (FONDEF) project on the automatic classification of urban sound events for the development of categorized noise maps of the city of Valdivia. My role was as leader and senior developer for the team in charge of the neural models that classify the stream of audio data. I personally developed the data classification pipelines starting from acquisition to inference APIs.
- Motivus: I'm one of the founders of this startup that focuses on building an ecosystem to share computing capacity and data processing algorithms.
- Latin American Conference on Computational Intelligence (LA-CCI): In 2021 and 2022 I was the chair of the neural and learning systems track of the LA-CCI, where I was in charge of reviewing and managing decisions for 50 papers related to neural networks.
- IEEE Summer Schools on Computational Intelligence: In 2019 I was the general organizer for a latin-american summer school with sponsorship from IEEE and chilean enterprises focused on neural networks, evolutionary computing and fuzzy systems. We had more than 300 participants from Chile and neighboring countries who experienced plenary lectures and tutorials by top international and national speakers.