



July 20, 2016

## Letter of Recommendation on Ivan Martynov

Ivan Martynov has been conducting research under my supervision on two different stages. First he was my Master student in Technomathematics, doing his Master thesis on pattern recognition applied to 3D laser scanned point clouds. He developed a highly original approach for first turning point clouds of target objects into triangulated 2D surfaces embedded in 3D space. In a second stage he then calculated the so-called persistent homology of these surfaces that lets us recognize and classify 3D objects by their invariant topological structure for applications in e.g. quality control of manufacturing. In all this work Ivan Martynov was a highly independent and innovative student that independently found and implemented in software the tools and methods that were the best for each task at hand.

In his second stage as a part-time PhD student of mine Ivan Martynov has been developing methods for processing satellite images for forest measurement purposes. His particular target has been to identify automatically areas in a satellite image that are in the shadow of mountains or other topographic features. Such a separation of sunlit and umbrous areas is necessary because the optical properties of reflected sunlight, as captured by satellite instruments on board multi-spectral satellites, vary as a function of shadow, even if the underlying target is the same. We therefore need to use a different mathematical model to link band values to physiological variables like tree biomass in sunlit and umbrous areas. Once again, Ivan Martynov has developed the methods he needs independently and with great success.

Ivan Martynov is an intelligent and independent engineer with excellent capability for solving complex programming tasks assigned to him. I am happy to warmly recommend him to technically demanding software development and research and development tasks.

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