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### **Supervisor Review of the Bachelor Thesis of Micha Birklbauer**

The Bachelor Thesis of Micha Birklbauer on "Imputation of Missing Values In Clinical Data" investigates multiple imputation methods on a clinical dataset about the mortality of patients after heart valve surgery. The basis of this Bachelor Thesis is an existing publication on mortality prediction. In this publication the most basic form of data imputation was used. Hence a thorough examination of the influence of more advanced imputation methods is of great interest.

Micha performed an extensive amount of experiments. He trained and evaluated various imputation methods on multiple percentages of missing values. Per level of missingness he performed various two sample tests for all combinations of methods to assess if a method can be regarded as significantly more effective. This alone requires a great deal of determination and endurance. He carried out his practical work independently, perhaps even with a bit too little consultation. This might be due to the fact that Micha had to change his supervisor during the thesis, which for sure was unfortunate and represented a difficulty. However, it would probably have made more sense to carry out fewer experiments, to test fewer methods, but to make the experiments more comprehensive and therefore be able to make stronger statements about the performance of imputations methods with respect to the given task. The mostly inconclusive results might be due to the chosen methodology and not due to the methods per se. Besides this criticism the experiments and the statistical treatment were performed rigorously.

Apart from that Micha proved to not only be open to criticism but he also responded adequately to it.

Proposals were promptly adopted and implemented.

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In his thesis Micha proved to understand the mechanisms of the scientific method. He showed to be able to communicate his work in an adequate way. He always valued our feedback and we enjoyed working with him. We can confidently state that Micha is worthy of obtaining a Bachelor of Science title, given the work he performed for this thesis.



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