

List of Dissertation Abstract (Department of Information Environment)

| Name | Supervisor | Title | Abstract |
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| Kobayashi Tatsuaki | Nagao Tomoharu | A Study on Explainability in Extracting Biological Features from Medical Images Based on Machine Learning | Computer-aided diagnosis (CAD) and Radiomics are data science tools that use medical images. Products produced from CAD and Radiomics have the potential to contribute to diagnostic decision support and improve the efficiency of the treatment process and are expected to have further applications. On the other hand, there has been a growing demand not only for the accuracy of models but also for the ability of models to provide evidence acceptable to healthcare professionals and patients, i.e., explainability. Therefore, this paper reports the validation results of machine learning-based biological feature extraction for the classification of medical images in the pursuit of better classification accuracy and explainability. |
| Eom Seungjae | Ozeki Kenta | Structures related to edge-coloring in 3- or 4-regular graphs | In this thesis, we focus on 3- or 4- regular graphs of Class 2. For a 4-regular graph, we study the hierarchy of the family of 4-regular graphs of Class 2, in the view of a 2-factor. For a 3-regular graph, we study a bisection on the regular graphs. Cui and Liu showed that if G is a claw-free cubic graph, G has a 2-bisection. In this thesis, we will improve their result using the number of monochromatic edges in a 2-bisection, where monochromatic edges are one connecting two vertices of the same part of the 2-bisection. |

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| Uchida Kento | Shirakawa Shinichi | A Study on Convergence Analysis and Performance Improvement of Continuous Black-Box Optimization Using Gaussian Distribution | <p>Since the performance of evolution strategies is affected by the hyperparameter setting, the condition to ensure the search performance has been investigated theoretically and experimentally. However, existing theoretical analyses have relaxed their difficulties by considering unrealistic situations, such as an infinite sample size. From the experimental aspect, the recommended hyperparameter setting has been pursued using well-tuned testbeds. However, the testbeds do not consider some properties, such as low effective dimensionality (LED), that appeared in real-world applications. This study shows theoretical analyses of evolution strategies under realistic situations and an improvement of covariance matrix adaptation evolution strategy for functions with LED.</p> |
| Ohashi Ryo | Harashita Shushi | The a -numbers, superspeciality and maximality of genus-3 curves | <p>In this paper, we considered three families of genus-3 curves, and examined the a-numbers, superspeciality and maximality of them. One of our main theorems is that we found a family of curves which satisfies the following property: If a curve is nonsingular and superspecial, then it is maximal or minimal over \mathbb{F}_{p^2}. Moreover, we gave a condition to judge whether the curve is maximal or minimal. We think that this result is useful as an efficient way to generate maximal genus-3 curves explicitly.</p> |