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A Machine Learning Approach to Analyze the Surface Properties of Biological Materials

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Similar to how CRISPR has revolutionized the field of molecular biology, machine learning may drastically boost research in the area of materials science. Machine learning is a fast-evolving method that allows for analyzing big data and unveiling correlations that otherwise would remain undiscovered. It may hold invaluable potential to engineer novel functional materials with desired properties – a field, which is currently limited by time-consuming trial and error approaches and our limited understanding of how different material properties depend on each other. Here, we apply machine learning algorithms to classify complex biological materials based on their micro-topography. With this approach,

the surfaces of different variants of biofilms and plant leaves can not only be distinguished but also correctly classified according to their wettability. Furthermore, an importance ranking provided by one of the algorithms allows us to identify those surface features that are critical for a successful sample classification. Our study exemplifies how machine learning can contribute to the analysis and categorization of complex surfaces – a tool, which can be highly useful for other areas of materials science, such as damage assessment as well as adhesion or friction studies.

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