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Computational analysis of airflow dynamics for predicting collapsible sites in the upper airways: Advanced machine learning SUSIE RYU, SEUNG HO YEOM, YOUNG WOO KIM, JOON SANG LEE, HYUNG JU CHO, YOON JEONG CHOI, HWI DONG JUNG, Yonsei university, Seoul, Korea — Recently, the number of patients who undergo orthodontic treatment of sleep apnea is increasing. Existing diagnostic methods, the polysomnography (PSG), however, have not been able to provide quantitative criteria and the non-scientific judgment method. Moreover, it is uncomfortable method to patent. In order to solve these problems, people try to use computational fluid dynamics (CFD) using upper airway geometry from the computed tomography (CT) data. The patients who have sleep apnea have considerable pressure drop is occurred due to a narrow airway. This feature is the main indicator of that used to determine the patient has OSAS or not. This study makes CFD models of upper airway for increasing the quantity of airway model data and simulate it to get aerodynamic features. Because of the requiring of heavy computational time cost, this study uses a machine learning algorithm. We use multivariate gaussian process machine learning for predicting aerodynamic features of unknown patents. This method can eliminate the high time consuming of CFD computation time. Also, we use Support vector machine learning algorithm to classify between normal and moderate OSAS patient. This algorithm classification showed about 80% classification accuracy that can be useful decision to clinician.

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