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Decision-Tree-Based Foot Disorders Classification Using Demographic Variable

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Abstract : Background:-Due to the essential role of the foot in movement, foot disorders (FDs) have significant impacts on activity and quality of life. Many studies confirmed the association between FDs and demographic characteristics. On the other hand, recent advances in data collection and statistical analysis led to an increase in the volume of databases. Analysis of patient's data through the decision tree can be used to explore the relationship between demographic characteristics and FDs. Significance of the study: This study aimed to investigate the relationship between demographic characteristics with common FDs. The second purpose is to better inform foot intervention, we classify FDs based on demographic variables. Methodologies: We analyzed 2323 subjects with pes-planus (PP), pes-cavus (PC), hallux-valgus (HV) and plantar-fasciitis (PF) who were referred to a foot therapy clinic between 2015 and 2021. Subjects had to fulfill the following inclusion criteria: (1) weight between 14 to 150 kilogram, (2) height between 30 to 220, (3) age between 3 to 100 years old, and (4) BMI between 12 to 35. Medical archives of 2323 subjects were recorded retrospectively and all the subjects examined by an experienced physician. Age and BMI were classified into five and four groups, respectively. 80% of the data were randomly selected as training data and 20% tested. We build a decision tree model to classify FDs using demographic characteristics. Findings: Results demonstrated 981 subjects from 2323 (41.9%) of people who were referred to the clinic with FDs were diagnosed as PP, 657 (28.2%) PC, 628 (27%) HV and 213 (9%) identified with PF. The results revealed that the prevalence of PP decreased in people over 18 years of age and in children over 7 years. In adults, the prevalence depends first on BMI and then on gender. About 10% of adults and 81% of children with low BMI have PP. There is no relationship between gender and PP. PC is more dependent on age and gender. In children under 7 years, the prevalence was twice in girls (10%) than boys (5%) and in adults over 18 years slightly higher in men (62% vs 57%). HV increased with age in women and decreased in men. Aging and obesity have increased the prevalence of PF. We conclude that the accuracy of our approach is sufficient for most research applications in FDs. Conclusion:-The increased prevalence of PP in children is probably due to the formation of the arch of the foot at this age. Increasing BMI by applying high pressure on the foot can increase the prevalence of this disorder in the foot. In PC, the Increasing prevalence of PC from women to men with age may be due to genetics and innate susceptibility of men to this disorder. HV is more common in adult women, which may be due to environmental reasons such as shoes, and the prevalence of PF in obese adult women may also be due to higher foot pressure and housekeeping activities.

Keywords : decision tree, demographic characteristics, foot disorders, machine learning
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