*Исследование взаимосвязи толщины лесной подстилки
и лесотаксационных характеристик с помощью
методов машинного обучения*

Original article

Exploring the Relationship between Forest Litter Thickness and Forest Taxation Characteristics Using Machine Learning Methods

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Abstract. *Based on field measurements of forest litter and forest inventory on tree level, regression models are constructed by machine learning methods to estimate the dependence of the thickness (power) of the litter from the set of counting characteristics. The spatial level of modelling corresponds to the parcel level of biogeocoenosis structure. The models describe the dependence of litter thickness on the type of forest conditions, tree species, yield class, tree heights, tree ages, maximum tree crown widths, and diameter at 1.3 m height. Litter samples were collected in multiple repetitions in sample plots simultaneously with the state forest inventory of the 2nd cycle in Valdai District of Novgorod Region. The sample size is 260. Seven machine learning algorithms were experimentally tested for model building: neural network regression, regularized linear regression, boosting regression, decision tree method, Random Forest method, support vector method and K-nearest neighbors' method. The models built by the K-nearest neighbors' method and the support vector method were found to be optimal based on a combination of quality criteria and coefficient of determination. The share of variance explained by the models in the total variance of the target variable is 0.85–0.86, and the error in predicting litter thickness is ≈22–29%, respectively. The results of the study demonstrated the effectiveness of using machine learning methods to build models of such indicators, for which there are no accurate measurement methods and which are characterized by extreme variability in space and time.*

Key words: forest litter, thickness of litter, sample plots, machine learning, regression models

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