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Failure Detection in Eucalyptus Plantation Based on UAV Images

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摘要 The information of the locations and numbers of failures is crucial to precise management of new afforestation, especially during seedling replanting in young forests. In practice, foresters are more accustomed to determining the locations of failures according to their rows than based on their geographical coordinates. The relative locations of failures are more difficult to collect than the absolute geographic coordinates which are available from an orthoimage. This paper develops a novel methodology for obtaining the relative locations of failures in rows and counting the number of failures in each row. The methodology contains two parts: (1) the interpretation of the direction angle of seedlings rows on an unmanned aerial vehicle (UAV) orthoimage based on the probability statistical theory (called the grid-variance (GV) method); (2) the recognition of the centerline of each seedling rows using K-means and the approach to counting failures in each row based on the distribution of canopy pixels near the centerline of each seedling row (called the centerline (CL) method). The experimental results showed that the GV method can accurately interpret the direction angle of rows (45°) in an orthoimage and the CL method can quickly and accurately obtain the numbers and relative locations of failures in rows. The failure detection rates in the two experimental areas were 91.8% and 95%, respectively. These research findings can provide technical support for the precise cultivation of planted seedling forests.

服务人员	付贺龙
服务院士	唐守正
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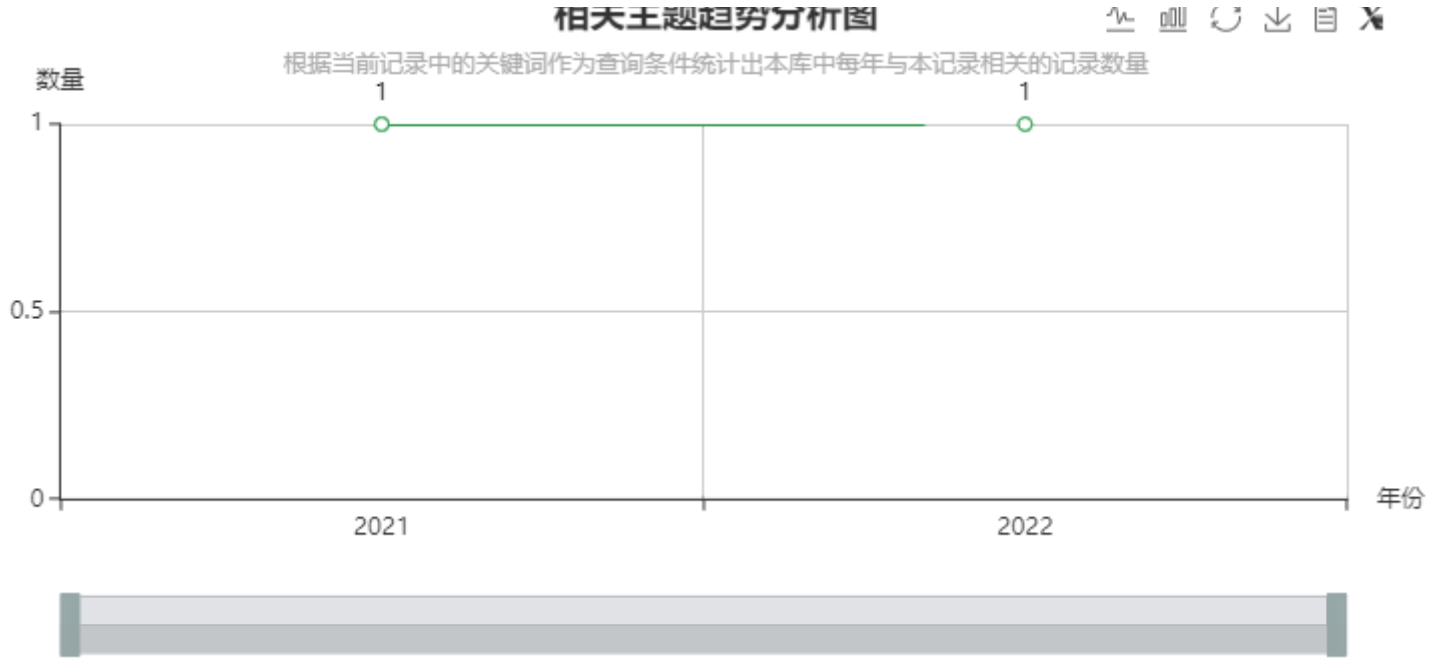
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