Package 'PDIndex'

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Title Disease Intensity and Progress Curve Indices for Plant Pathology

Type Package

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Description Provides standardised functions for quantifying plant disease intensity and disease development over time. The package implements Percent Disease Index (PDI) for assessing overall disease severity based on categorical ratings, Area Under the Disease Progress Curve (AUDPC) for summarizing disease progression using trapezoidal integration, and Relative AUDPC (rAUDPC) for expressing disease development relative to the maximum possible severity over the observation period. These indices are widely used in plant pathology and epidemiology for comparing treatments, cultivars, and environments.

License GPL-3

Encoding UTF-8

RoxygenNote 7.3.3

NeedsCompilation no

Repository CRAN

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Contents

AUDPC *Area Under the Disease Progress Curve (AUDPC)*

Description

Calculates the Area Under the Disease Progress Curve (AUDPC) using the trapezoidal integration method.

Usage

```
AUDPC(time, severity)
```

Arguments

time	A numeric vector of time points (e.g., days after sowing or inoculation). Values must be in strictly increasing order.
severity	A numeric vector of disease severity values corresponding to each time point.

Details

AUDPC is calculated as:

$$AUDPC = \sum_{i=1}^{n-1} \frac{(Y_i + Y_{i+1})}{2}(T_{i+1} - T_i)$$

where Y is disease severity at time T.

Value

A numeric value representing AUDPC.

Examples

```
{
time <- c(0, 7, 14, 21, 28)
severity <- c(5, 15, 30, 45, 60)
AUDPC(time, severity)
}
```

PDI *Percent Disease Index (PDI)*

Description

Calculates Percent Disease Index (PDI) based on disease grades and their corresponding frequencies.

Usage

```
PDI(freq)
```

Arguments

freq	A numeric vector of frequencies for each disease grade (starting from grade 0).

Details

PDI is calculated as:

$$PDI = (\sum(grade \times frequency)/(N \times max\_grade)) \times 100$$

where N is the total number of observations.

Value

A numeric value representing Percent Disease Index (PDI).

Examples

```
{
freq <- c(10, 8, 6, 4, 2, 1)
PDI(freq)
}
```

rAUDPC *Relative Area Under the Disease Progress Curve (rAUDPC)*

Description

Calculates the Relative Area Under the Disease Progress Curve (rAUDPC), which expresses AUDPC as a percentage of the maximum possible disease development over the observation period.

Usage

```
rAUDPC(time, severity, max_severity)
```

Arguments

time	A numeric vector of time points (e.g., days after sowing or inoculation). Values must be in strictly increasing order.
severity	A numeric vector of disease severity values corresponding to each time point.
max_severity	A numeric value representing the maximum possible disease severity on the rating scale.

Details

rAUDPC is calculated as:

$$rAUDPC = \left(\frac{AUDPC}{(T_{max} - T_{min}) \times Y_{max}} \right) \times 100$$

where $AUDPC$ is the area under the disease progress curve, T_{max} and T_{min} are the maximum and minimum time points, and Y_{max} is the maximum disease severity.

Value

A numeric value representing relative AUDPC (percentage).

Examples

```
{
time <- c(0, 7, 14, 21, 28)
severity <- c(5, 15, 30, 45, 60)
max_severity <- 100
rAUDPC(time, severity, max_severity)
}
```

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