Package ‘WordOfMouth’

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Type Package
Title Estimates Economic Variables for Word-of-Mouth-Campaigns
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Maintainer Michael Scholz <michael.scholz@th-deg.de>
Description Methods for estimating profit, profit-maximizing price, demand and consumer surplus of Word-of-Mouth-campaigns on mean-field networks.
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Author Michael Scholz [cre, aut],
    Thomas Woehner [aut],
    Ralf Peters [ctb]
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R topics documented:

- WordOfMouth-package
- compareToFIMarket
- computeConsumerSurplus
- computeDemand
- computeInformationCostsThreshold
- computeOptimalPrice
- computeProfit
- computeRoundDemand
- computeWoMIntensity
Description

This package provides classes, methods and functions for modeling Word-of-Mouth-campaigns. General model assumptions are:

- monopoly market
- no variable costs
- network is the mean-field case of percolation
- only those persons who bought a product will forward information about it

Details

Package: WordOfMouth
Type: Package
Version: 1.1.0
Date: 2021-10-04
License: GPL-3
Depends: R (>= 3.0.1), methods

Author(s)

Michael Scholz <michael.scholz@th-deg.de>
Thomas Woehner <Thomas.Woehner@eah-jena.de>
Ralf Peters <ralf.peters@wiwi.uni-halle.de>

compareToFIMarket

Compares the welfare of the WoM campaign to that of a fully informed market
**computeConsumerSurplus**

**Description**

Computes the expected cumulative consumer surplus for a given Word-of-Mouth campaign at a given price.

**Usage**

```r
computeConsumerSurplus(campaign, price)
```

**Examples**

```r
network <- new("WoMNetwork", size = 1000, avgConnections = 5)
campaign <- new("WoMCampaign", network = network, seedingSize = 10, forwardProbability = 0.2)
comparison <- compareToFIMarket(campaign)
print(comparison)
```
computeDemand

Arguments

- **campaign**: Word-of-Mouth campaign as instance of class WoMCampaign.
- **price**: Price as number in [0; 1] where 0 is the minimal and 1 is the maximal price.

Value

Expected cumulative consumer surplus.

Author(s)

- Michael Scholz <michael.scholz@th-deg.de>
- Thomas Woehner <Thomas.Woehner@eah-jena.de>
- Ralf Peters <ralf.peters@wiwi.uni-halle.de>

See Also

computeDemand, computeProfit, computeOptimalPrice

Examples

```r
network <- new("WoMNetwork", size = 1000, avgConnections = 5)
campaign <- new("WoMCampaign", network = network, seedingSize = 10, forwardProbability = 0.2)
surplus <- computeConsumerSurplus(campaign, price = 0.5)
print(surplus)
```

```
computeDemand  Computes the expected demand
```

Description

Computes the expected demand for a given Word-of-Mouth campaign at a given price.

Usage

```r
computeDemand(campaign, price)
```

Arguments

- **campaign**: Word-of-Mouth campaign as instance of class WoMCampaign.
- **price**: Price as number in [0; 1] where 0 is the minimal and 1 is the maximal price.

Value

Expected demand in number of persons.
computeInformationCostsThreshold

Author(s)

Michael Scholz <michael.scholz@th.deg.de>
Thomas Woehner <Thomas.Woehner@eah-jena.de>
Ralf Peters <ralf.peters@wiwi.uni-halle.de>

See Also

computeRoundDemand computeProfit computeConsumerSurplus computeOptimalPrice

Examples

```r
network <- new("WoMNetwork", size = 1000, avgConnections = 5)
campaign <- new("WoMCampaign", network = network, seedingSize = 10, forwardProbability = 0.2)
demand <- computeDemand(campaign, price = 0.5)
print(demand)
```

demand <- computeInformationCostsThreshold(campaign)

Description

Computes the information costs that need to be surpassed in order to generate a higher profit than in a transparent market.

Usage

computeInformationCostsThreshold(campaign)

Arguments

campaign Word-of-Mouth campaign as instance of class WoMCampaign.

Value

Information costs in [0; 1] that need to be surpassed in order to generate a higher profit than in a transparent market.

Author(s)

Michael Scholz <michael.scholz@th.deg.de>
Thomas Woehner <Thomas.Woehner@eah-jena.de>
Ralf Peters <ralf.peters@wiwi.uni-halle.de>
computeOptimalPrice

Description

Computes the profit-maximizing for a given Word-of-Mouth campaign.

Usage

computeOptimalPrice(campaign)

Arguments

campaign Word-of-Mouth campaign as instance of class WoMCampaign.

Value

Profit-maximizing price in [0; 1] where 0 is the lowest possible and 1 is the highest possible price.

Author(s)

Michael Scholz <michael.scholz@th-deg.de>
Thomas Woehner <Thomas.Woehner@eah-jena.de>
Ralf Peters <ralf.peters@wiwi.uni-halle.de>

See Also

computeDemand computeProfit computeConsumerSurplus
**computeProfit**

**Examples**

```r
network <- new("WoMNetwork", size = 1000, avgConnections = 5)
campaign <- new("WoMCampaign", network = network, seedingSize = 10, forwardProbability = 0.2)
price <- computeOptimalPrice(campaign)
profit <- computeProfit(campaign, price)
print(price)
print(profit)
```

---

**computeProfit**  
*Computes the expected profit*

**Description**

Computes the expected profit for a given Word-of-Mouth campaign at a given price.

**Usage**

```r
computeProfit(campaign, price)
```

**Arguments**

- `campaign`: Word-of-Mouth campaign as instance of class `WoMCampaign`.
- `price`: Price as number in [0; 1] where 0 is the minimal and 1 is the maximal price.

**Value**

Expected profit as number of persons times price.

**Author(s)**

Michael Scholz <michael.scholz@th-deg.de>
Thomas Woehner <Thomas.Woehner@eah-jena.de>
Ralf Peters <ralf.peters@wiwi.uni-halle.de>

**See Also**

- `computeDemand`
- `computeConsumerSurplus`
- `computeOptimalPrice`

**Examples**

```r
network <- new("WoMNetwork", size = 1000, avgConnections = 5)
campaign <- new("WoMCampaign", network = network, seedingSize = 10, forwardProbability = 0.2)
profit <- computeProfit(campaign, price = 0.5)
print(profit)
```
### computeRoundDemand

**Computes the expected demand per round**

#### Description

Computes the expected demand for a given Word-of-Mouth campaign at a given price and a given round or a given round and all previous rounds.

#### Usage

```r
computeRoundDemand(campaign, price, round, previousRounds = TRUE)
```

#### Arguments

- **campaign**: Word-of-Mouth campaign as instance of class WoMCampaign.
- **price**: Price as number in [0; 1] where 0 is the minimal and 1 is the maximal price.
- **round**: Round at which or until which the demand per round will be computed.
- **previousRounds**: Should the demand of all previous rounds be returned or not. Default is TRUE.

#### Value

Expected demand in number of persons. Note that the first value in the demand vector is the number of initial consumers when previousRounds is TRUE. The number of initial consumers is \((1-p) \times \text{seedingSize}\).

#### Author(s)

Michael Scholz <michael.scholz@th-deg.de>
Thomas Woehner <Thomas.Woehner@eah-jena.de>
Ralf Peters <ralf.peters@wiwi.uni-halle.de>

#### See Also

- `computeDemand`
- `computeProfit`
- `computeConsumerSurplus`
- `computeOptimalPrice`

#### Examples

```r
network <- new("WoMNetwork", size = 1000, avgConnections = 5)
campaign <- new("WoMCampaign", network = network, seedingSize = 10, forwardProbability = 0.2)
demand <- computeRoundDemand(campaign, price = 0.5, round = 3)
print(demand)
```
computeWoMIntensity

Computes the WoM intensity

Description

Computes the WoM intensity in a given Word-of-Mouth campaign.

Usage

computeWoMIntensity(campaign)

Arguments

campaign Word-of-Mouth campaign as instance of class WoMCampaign.

Value

WoM intensity in [0; 1].

Author(s)

Michael Scholz <michael.scholz@th-deg.de>
Thomas Woehner <Thomas.Woehner@eah-jena.de>
Ralf Peters <ralf.peters@wiwi.uni-halle.de>

Examples

```r
network <- new("WoMNetwork", size = 1000, avgConnections = 5)
campaign <- new("WoMCampaign", network = network, seedingSize = 10, forwardProbability = 0.2)
intensity <- computeWoMIntensity(campaign)
print(intensity)
```

show,WoMCampaign-method

Shows a WoMCampaign object

Description

Shows a WoMCampaign object

Usage

## S4 method for signature 'WoMCampaign'
show(object)
show,WoMNetwork-method

Arguments

object  An instance of the WoMCampaign-class

Methods

list("signature(object = \"WoMCampaign\")")  Shows an WoMCampaign object.

Author(s)

Michael Scholz <michael.scholz@th-deg.de>
Thomas Woehner <Thomas.Woehner@eah-jena.de>
Ralf Peters <ralf.peters@wiwi.uni-halle.de>

Description

Shows a WoMNetwork object

Usage

## S4 method for signature 'WoMNetwork'
show(object)

Arguments

object  An instance of the WoMNetwork-class

Methods

list("signature(object = \"WoMNetwork\")")  Shows an WoMNetwork object.

Author(s)

Michael Scholz <michael.scholz@th-deg.de>
Thomas Woehner <Thomas.Woehner@eah-jena.de>
Ralf Peters <ralf.peters@wiwi.uni-halle.de>
Description

This class represents a WoM campaign that is performed on a given network to promote a durable good with no variable costs.

Slots

network (WoMNetwork) The network to which the WoM campaign is applied.

seedingSize (numeric) Number of consumers who are initially informed about the good by the firm.

forwardProbability (numeric) Probability at which a consumer forwards information about the good to others.

informationCosts (numeric) Costs to information one consumer about the good.

Objects from the Class

Objects can be created by calls of the form \texttt{new("WoMCampaign", ...)}. This S4 class describes \texttt{WoMNetwork} objects.

Author(s)

Michael Scholz \texttt{<michael.scholz@th-deg.de>}

Thomas Woehner \texttt{<Thomas.Woehner@eah-jena.de>}

Ralf Peters \texttt{<ralf.peters@wiwi.uni-halle.de>}

Examples

```r
network <- new("WoMNetwork", size = 1000, avgConnections = 5)
campaign <- new("WoMCampaign", network = network, seedingSize = 10, forwardProbability = 0.2)
print(campaign)
```
Description
This class represents an average random graph.

Slots
size (numeric) The number of consumers in the network.
avgConnections (numeric) Average number of connections per consumer.

Objects from the Class
Objects can be created by calls of the form `new("WoMNetwork", ...)`. This S4 class describes `WoMNetwork` objects.

Author(s)
Michael Scholz <michael.scholz@th-deg.de>
Thomas Woehner <Thomas.Woehner@eah-jena.de>
Ralf Peters <ralf.peters@wiwi.uni-halle.de>

Examples
```r
network <- new("WoMNetwork", size = 1000, avgConnections = 5)
print(network)
```
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