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.

License GPL-3

Depends R (>= 3.0.1), methods, stats, LambertW

LazyLoad yes

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Author Michael Scholz [cre, aut],
Thomas Woehner [aut],
Ralf Peters [ctb]

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R topics documented:

WordOfMouth-package   *Estimates Economic Variables for Word-of-Mouth-Campaigns*

Description

This packages 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*

Description

Compares the welfare of the WoM campaign to the welfare of a fully informed market assuming a uniformly distributed willingness to pay.

Usage

```
compareToFIMarket(campaign)
```

Arguments

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

Value

Data frame containing the profit-maximizing price, the resulting demand, profit, consumer surplus and economic welfare for a fully informed market and a WoM 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>

See Also

computeOptimalPrice computeProfit computeConsumerSurplus

Examples

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

---

computeConsumerSurplus

Computes the expected cumulative consumer surplus

Description

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

Usage

```
computeConsumerSurplus(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 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

```
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

```
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.

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

```
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)
```

---

computeInformationCostsThreshold

Computes the information costs threshold

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>

See Also

computeOptimalPrice computeProfit

Examples

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

---

computeOptimalPrice   *Computes the profit-maximizing price*

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

Examples

```
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

```
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

```
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

```
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)*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

```
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

```
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)
```

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>

---

show,WoMNetwork-method
Shows a WoMNetwork *object*

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>

```
WoMCampaign-class        Class WoMCampaign
```

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 new("WoMCampaign",...). 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

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

WoMNetwork-class   *Class* WoMNetwork

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

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

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