

Graphical comparison of imprecise methods

Marco Cattaneo

Department of Statistics, LMU Munich

WPMSIIP 2012, Munich, Germany

12 September 2012

imprecise methods

- ▶ **imprecise methods** are methods yielding set-valued results

imprecise methods

- ▶ **imprecise methods** are methods yielding set-valued results
- ▶ the amount of **imprecision** of the methods is usually controlled by (at least) a **parameter**

imprecise methods

- ▶ **imprecise methods** are methods yielding set-valued results
- ▶ the amount of **imprecision** of the methods is usually controlled by (at least) a **parameter**
- ▶ examples:

imprecise method

imprecision parameter(s)

imprecise methods

- ▶ **imprecise methods** are methods yielding set-valued results
- ▶ the amount of **imprecision** of the methods is usually controlled by (at least) a **parameter**
- ▶ examples:

imprecise method	imprecision parameter(s)
confidence interval/region	confidence level $1 - \alpha$

imprecise methods

- ▶ **imprecise methods** are methods yielding set-valued results
- ▶ the amount of **imprecision** of the methods is usually controlled by (at least) a **parameter**
- ▶ examples:

imprecise method	imprecision parameter(s)
confidence interval/region	confidence level $1 - \alpha$
likelihood-based confidence interval/region	cutoff point β

imprecise methods

- ▶ **imprecise methods** are methods yielding set-valued results
- ▶ the amount of **imprecision** of the methods is usually controlled by (at least) a **parameter**
- ▶ examples:

imprecise method	imprecision parameter(s)
confidence interval/region	confidence level $1 - \alpha$
likelihood-based confidence interval/region	cutoff point β
IDM-based credal classifier	number of hidden instances s

imprecise methods

- ▶ **imprecise methods** are methods yielding set-valued results
- ▶ the amount of **imprecision** of the methods is usually controlled by (at least) a **parameter**
- ▶ examples:

imprecise method	imprecision parameter(s)
confidence interval/region	confidence level $1 - \alpha$
likelihood-based confidence interval/region	cutoff point β
IDM-based credal classifier	number of hidden instances s
ε -contaminated IDM-based credal classifier	s and ε

imprecise methods

- ▶ **imprecise methods** are methods yielding set-valued results
- ▶ the amount of **imprecision** of the methods is usually controlled by (at least) a **parameter**
- ▶ examples:

imprecise method	imprecision parameter(s)
confidence interval/region	confidence level $1 - \alpha$
likelihood-based confidence interval/region	cutoff point β
IDM-based credal classifier	number of hidden instances s
ε -contaminated IDM-based credal classifier	s and ε
likelihood-based credal classifier	cutoff point β

imprecise methods

- ▶ **imprecise methods** are methods yielding set-valued results
- ▶ the amount of **imprecision** of the methods is usually controlled by (at least) a **parameter**
- ▶ examples:

imprecise method	imprecision parameter(s)
confidence interval/region	confidence level $1 - \alpha$
likelihood-based confidence interval/region	cutoff point β
IDM-based credal classifier	number of hidden instances s
ε -contaminated IDM-based credal classifier	s and ε
likelihood-based credal classifier	cutoff point β
likelihood-based imprecise regression	cutoff point β (and ε)

evaluation

- ▶ it is usually possible to evaluate numerically two qualities of imprecise methods: **accuracy** and (im)**precision**

evaluation

- ▶ it is usually possible to evaluate numerically two qualities of imprecise methods: **accuracy** and (im)**precision**
- ▶ reducing these **two dimensions** of the numerical evaluation to a single one is problematic

evaluation

- ▶ it is usually possible to evaluate numerically two qualities of imprecise methods: **accuracy** and (im)**precision**
- ▶ reducing these **two dimensions** of the numerical evaluation to a single one is problematic
- ▶ examples:

imprecise method	accuracy	imprecision
-------------------------	-----------------	--------------------

evaluation

- ▶ it is usually possible to evaluate numerically two qualities of imprecise methods: **accuracy** and (im)**precision**
- ▶ reducing these **two dimensions** of the numerical evaluation to a single one is problematic
- ▶ examples:

imprecise method	accuracy	imprecision
confidence interval/region	coverage probability	expected length/volume

evaluation

- ▶ it is usually possible to evaluate numerically two qualities of imprecise methods: **accuracy** and (im)**precision**
- ▶ reducing these **two dimensions** of the numerical evaluation to a single one is problematic
- ▶ examples:

imprecise method	accuracy	imprecision
confidence interval/region	coverage probability	expected length/volume
credal classifier	(global) accuracy	average number of classes

evaluation

- ▶ it is usually possible to evaluate numerically two qualities of imprecise methods: **accuracy** and (im)**precision**
- ▶ reducing these **two dimensions** of the numerical evaluation to a single one is problematic
- ▶ examples:

imprecise method	accuracy	imprecision
confidence interval/region	coverage probability	expected length/volume
credal classifier	(global) accuracy	average number of classes
imprecise regression	coverage probability	expected volume

graphical comparison

- ▶ for each imprecise method, plot the pair **(accuracy,precision)** as a **function of the imprecision parameter(s)**

graphical comparison

- ▶ for each imprecise method, plot the pair **(accuracy,precision)** as a **function of the imprecision parameter(s)**
- ▶ **example:** confidence interval for the mean of 10 normally/ t_3 distributed observations (with unknown variance σ^2)

graphical comparison

- ▶ for each imprecise method, plot the pair **(accuracy,precision)** as a **function of the imprecision parameter(s)**
- ▶ **example:** confidence interval for the mean of 10 normally/ t_3 distributed observations (with unknown variance σ^2)

