Vignette for `dampack` package

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Estimation of Dirichlet parameters using MoM

This function returns the α parameteres of a dirichlet distribution following the method of moments (MoM) proposed by Fielitz and Myers (1975) and Narayanan (1992).

If μ is a vector of means and σ is a vector of standard deviations of the random variable, then the second moment X_2 is defined by $\sigma^2 + \mu^2$. Using the mean and the second moment, the J alpha parameters are computed as follows

$$\alpha_i = \frac{(\mu_1 - X_{2_1})\mu_i}{X_{2_1} - \mu_1^2}$$

for $i = 1, \ldots, J-1$, and

$$\alpha_J = \frac{(\mu_1 - X_{2_1})(1 - \sum_{i=1}^{J-1} \mu_i)}{X_{2_1} - \mu_1^2}$$

Estimation of Log-normal parameters uisng MoM

This function returns the location, μ, and scale, σ, parameteres of a log-normal distribution from the mean and variance of a random variable following the method of moments (MoM).

Given the non-logarithmized mean and variance m and v of the random variable, respectively, the location, μ, and scale, σ, of a log-normal distribution are given by the following equations

$$\mu = \ln\left(\frac{m}{\sqrt{\left(1 + \frac{v}{m^2}\right)}}\right)$$

and

$$\sigma = \sqrt{\ln\left(1 + \frac{v}{m^2}\right)}$$

EVPPI using linear regression metamodeling

The expected value of partial pefect information (EVPPI) is the expected value of perfect information from a subset of parameters of interest, θ_I of a cost-effectiveness analysis (CEA) of D different strategies with parameters $\theta = \{\theta_I, \theta_C\}$, where θ_C is the set of complimenatry parameters of the CEA. The function `evppi_lrmm` computes the EVPPI of θ_I from a matrix of net monetary benefits B of the CEA. Each column of B corresponds to the net benefit B_d of strategy d. The function `evppi_lrmm` computes the EVPPI using a linear regression metamodel (Strong, Oakley, and Brennan 2014; Jalal and Alarid-Escudero 2017) approach following these steps:

1. Determine the optimal strategy d^* from the expected net benefits $\bar{B}$

$$d^* = \arg\max_d \left\{\bar{B}\right\}$$

2. Compute the opportunity loss for each d strategy, L_d

$$L_d = B_d - B_{d^*}$$

3. Estimate a linear metamodel for the opportunity loss of each d strategy, L_d, by regressing them on the spline basis functions of θ_I, $f(\theta_I)$

$$L_d = \beta_0 + f(\theta_I) + \epsilon,$$

where ϵ is the residual term that captures the complementary parameters θ_C and the difference between the original simulation model and the metamodel.
4. Compute the EVPPI of θ_I using the estimated losses for each d strategy, $\hat{L}_d$ from the linear regression metamodel and applying the following equation:

$$\text{EVPPI}_{\theta_I} = \frac{1}{K}\sum_{i=1}^{K}\max_d\left(\hat{L}_d\right)$$

The spline model in step 3 is fitted using the `mgcv` package.

Vignette Info

Note the various macros within the `vignette` section of the metadata block above. These are required in order to instruct R how to build the vignette. Note that you should change the `title` field and the `\VignetteIndexEntry` to match the title of your vignette.

Styles

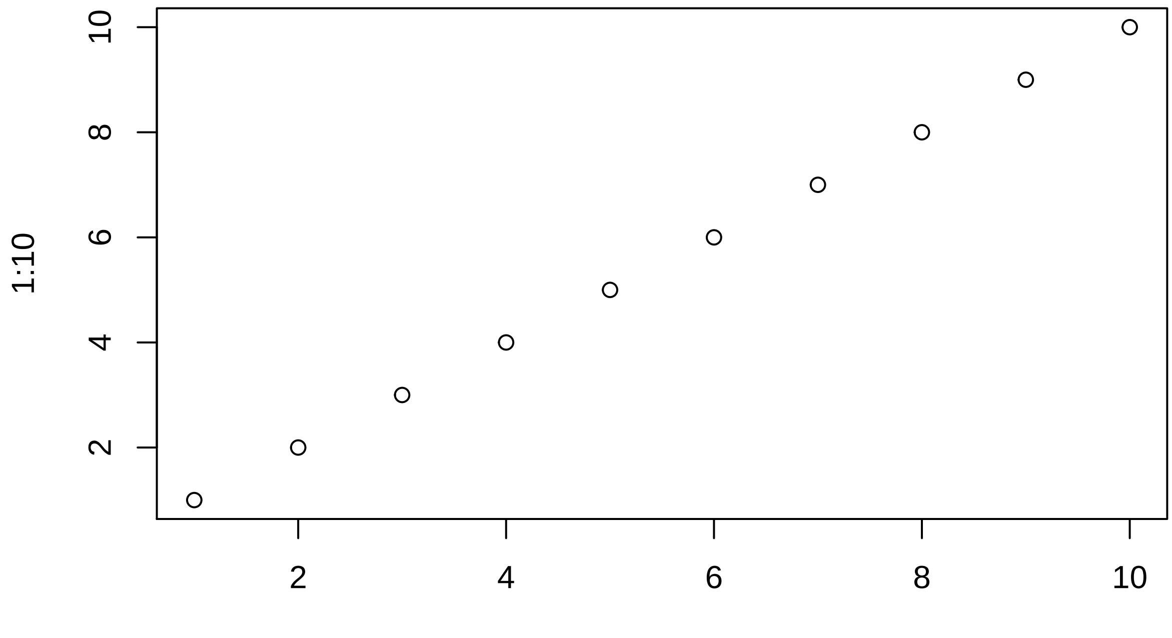
The `html_vignette` template includes a basic CSS theme. To override this theme you can specify your own CSS in the document metadata as follows:

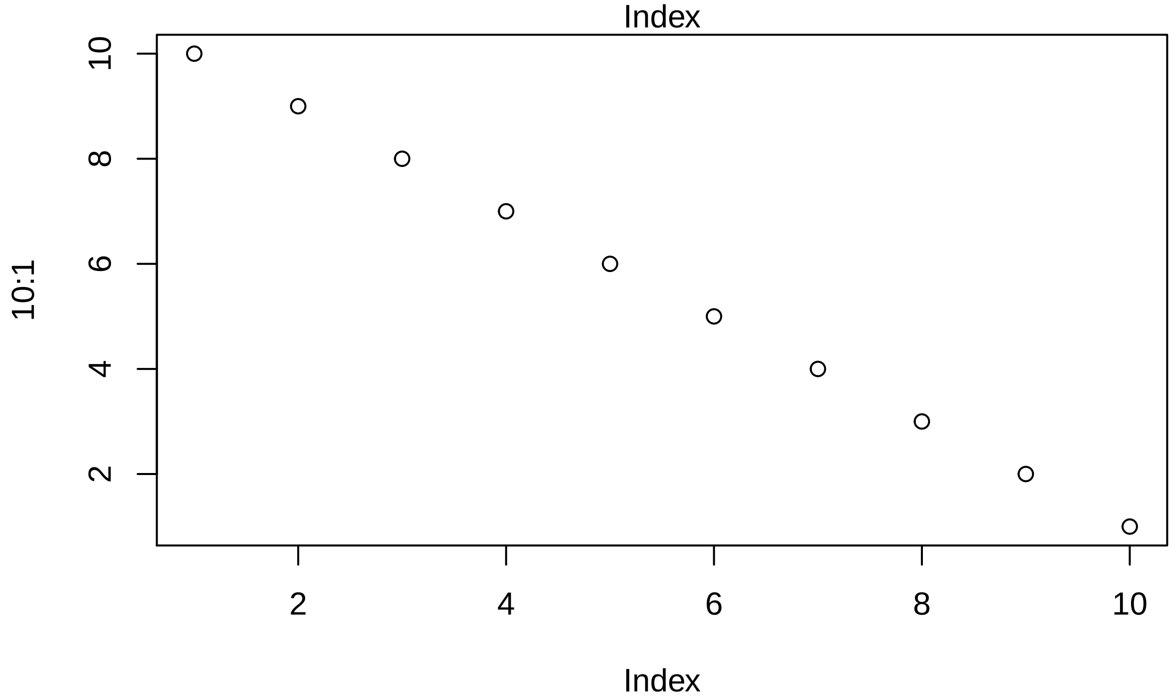
```
output:
  rmarkdown::html_vignette:
    css: mystyles.css
```

Figures

The figure sizes have been customised so that you can easily put two images side-by-side.

```r
plot(1:10)
plot(10:1)
```





You can enable figure captions by `fig_caption: yes` in YAML:

```
output:
  rmarkdown::html_vignette:
    fig_caption: yes
```

Then you can use the chunk option `fig.cap = "Your figure caption."` in **knitr**.

More Examples

You can write math expressions, e.g. $Y = X\beta + \epsilon$, footnotes[1], and tables, e.g. using `knitr::kable()`.

	mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
Mazda RX4	21.0	6	160.0	110	3.90	2.620	16.46	0	1	4	4
Mazda RX4 Wag	21.0	6	160.0	110	3.90	2.875	17.02	0	1	4	4
Datsun 710	22.8	4	108.0	93	3.85	2.320	18.61	1	1	4	1
Hornet 4 Drive	21.4	6	258.0	110	3.08	3.215	19.44	1	0	3	1
Hornet Sportabout	18.7	8	360.0	175	3.15	3.440	17.02	0	0	3	2
Valiant	18.1	6	225.0	105	2.76	3.460	20.22	1	0	3	1
Duster 360	14.3	8	360.0	245	3.21	3.570	15.84	0	0	3	4
Merc 240D	24.4	4	146.7	62	3.69	3.190	20.00	1	0	4	2
Merc 230	22.8	4	140.8	95	3.92	3.150	22.90	1	0	4	2
Merc 280	19.2	6	167.6	123	3.92	3.440	18.30	1	0	4	4

Also a quote using `>`:

> "He who gives up [code] safety for [code] speed deserves neither." (via)

References

Fielitz, Bruce D., and Buddy L. Myers. 1975. "Estimation of parameters in the beta distribution." *Decision Sciences* 6 (1): 1–13.

Jalal, Hawre, and Fernando Alarid-Escudero. 2017. "A Gaussian Approximation Approach for Value of Information Analysis." *Medical Decision Making* In Press: 1–55.

Narayanan, A. 1992. "A note on parameter estimation in the multivariate beta distribution." *Computers and Mathematics with Applications* 24 (10): 11–17. doi:10.1016/0898-1221(92)90016-B.

Strong, M., J. E. Oakley, and A. Brennan. 2014. "Estimating Multiparameter Partial Expected Value of Perfect Information from a Probabilistic Sensitivity Analysis Sample: A Nonparametric Regression Approach." *Medical Decision Making* 34 (3): 311–26. doi:10.1177/0272989X13505910.

[1] A footnote here.