

Introduction to signals

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Ilya Kipnis

Professional Quantitative Analyst and R
programmer

What are signals?

- Signals are the interactions of:
 - Market data with indicators
 - Indicators with other indicators
- Examples:
 - 50-day MA crossing over 200-day MA
 - Oscillator crosses under 20
- Signal is necessary (but not sufficient) for buy/sell order

Using `add.signal()`

- Very similar to the process for creating indicators
- Only a few signal functions

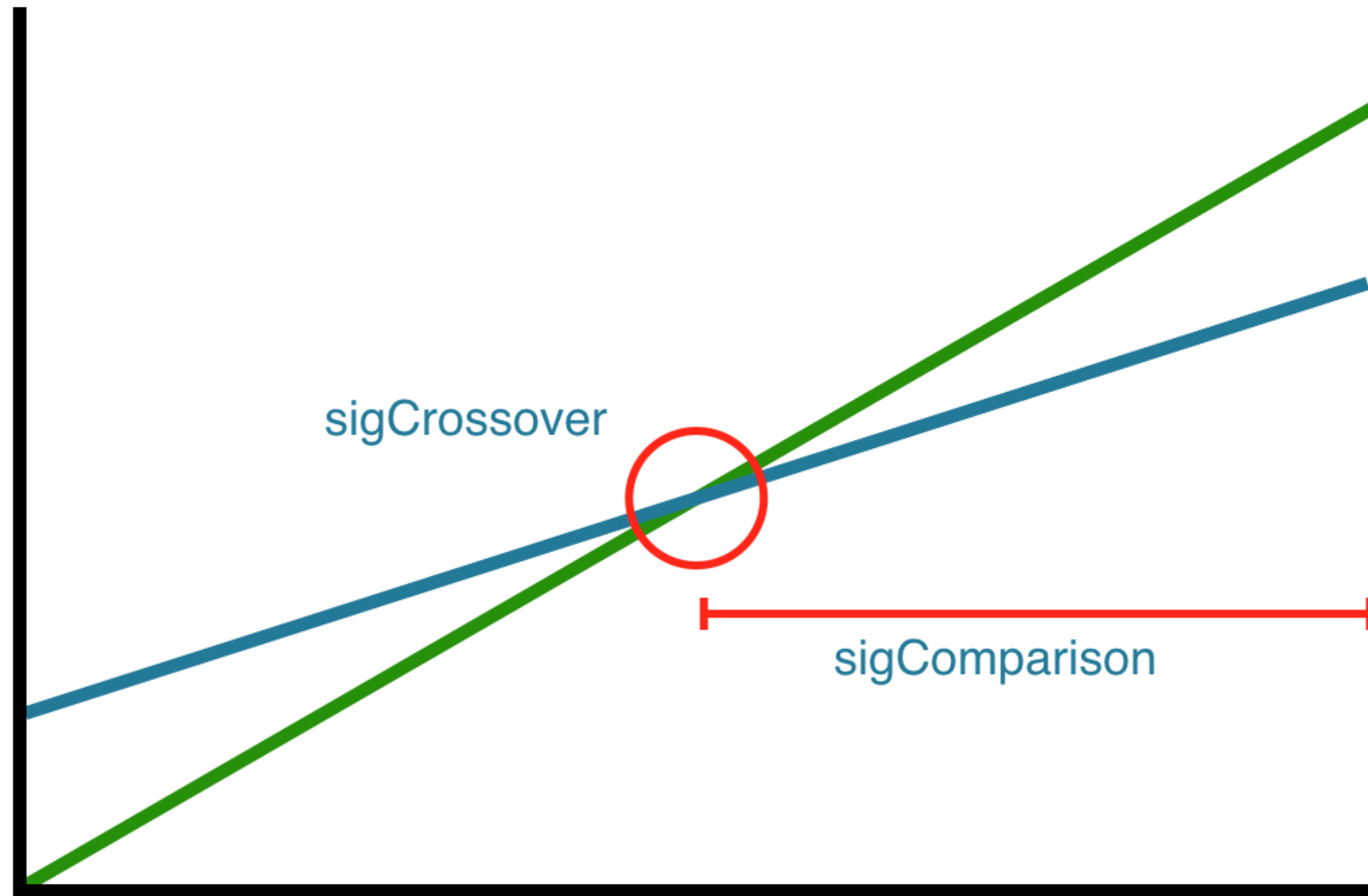
```
add.signal(strategy.st, name = "function",  
           arguments = list(arguments), label = "label")
```

- Again, similar to `apply` family

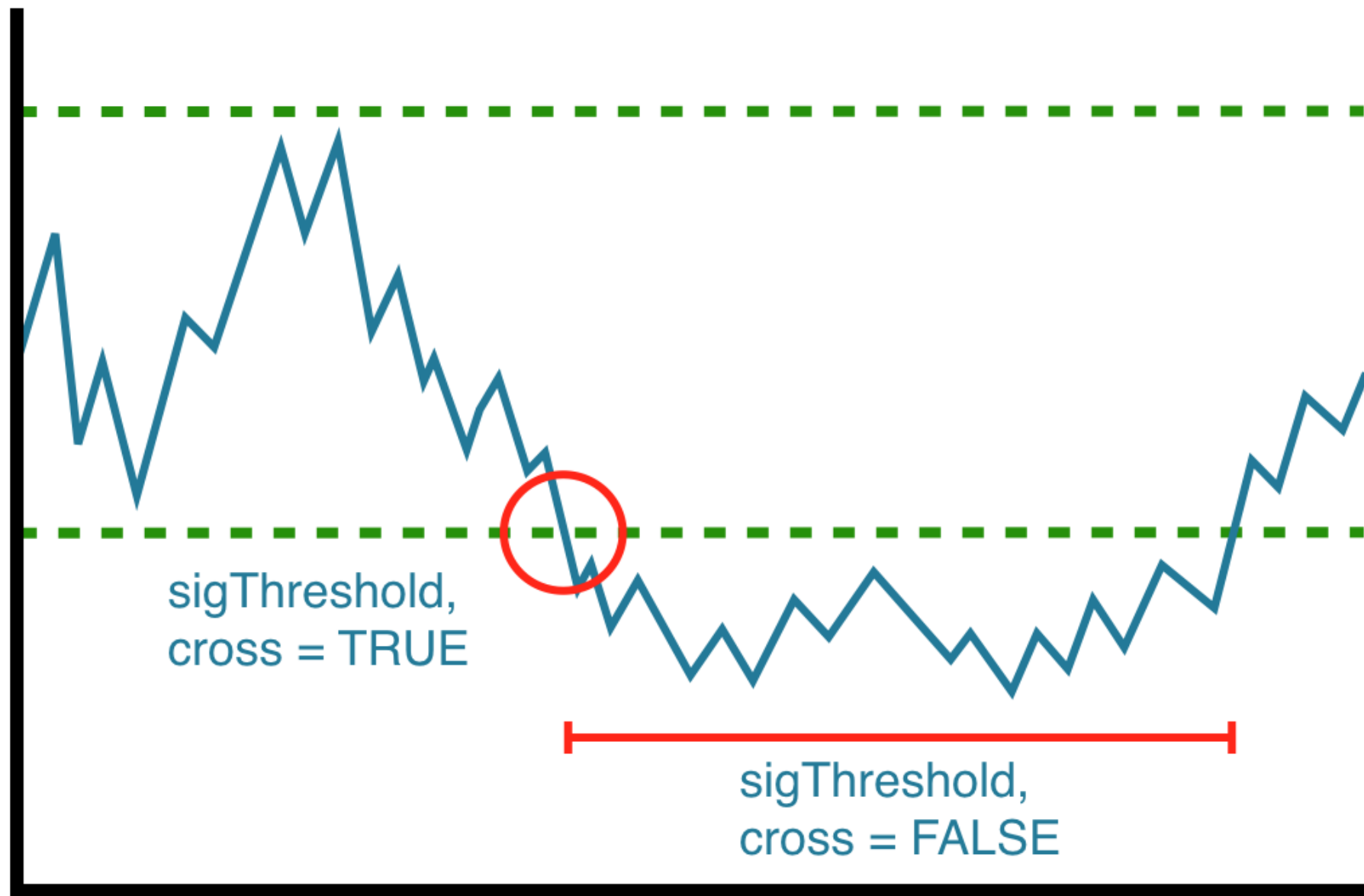
Four types of signals

- **sigComparison** : Relationship between two indicators, returns 1 if relationship is true
- **sigCrossover**: Similar to sigComparison, returns 1 on the first occurrence
- **sigThreshold**: Compares range-bound indicator to a static quantity
- **sigFormula**: Flexible signal function

Examples



Examples



Let's practice!
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sigComparison and sigCrossover

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Trend indicators

- `sigCrossover` and `sigComparison`
- Both compare two variable quantities
- Example:
 - shorter lookback MA crosses over longer lookback MA (50-day versus 200-day SMA)

Structure

```
add.signal(strategy.st, name = "sigComparison",  
            arguments = list(columns = c("str1", "str2"),  
                              relationship = "lt" ),  
            label = "siglabel")  
add.signal(strategy.st, name = "sigCrossover",  
            arguments = list(columns = c( "str1", "str2"),  
                              relationship = "eq"),  
            label = "siglabel")
```

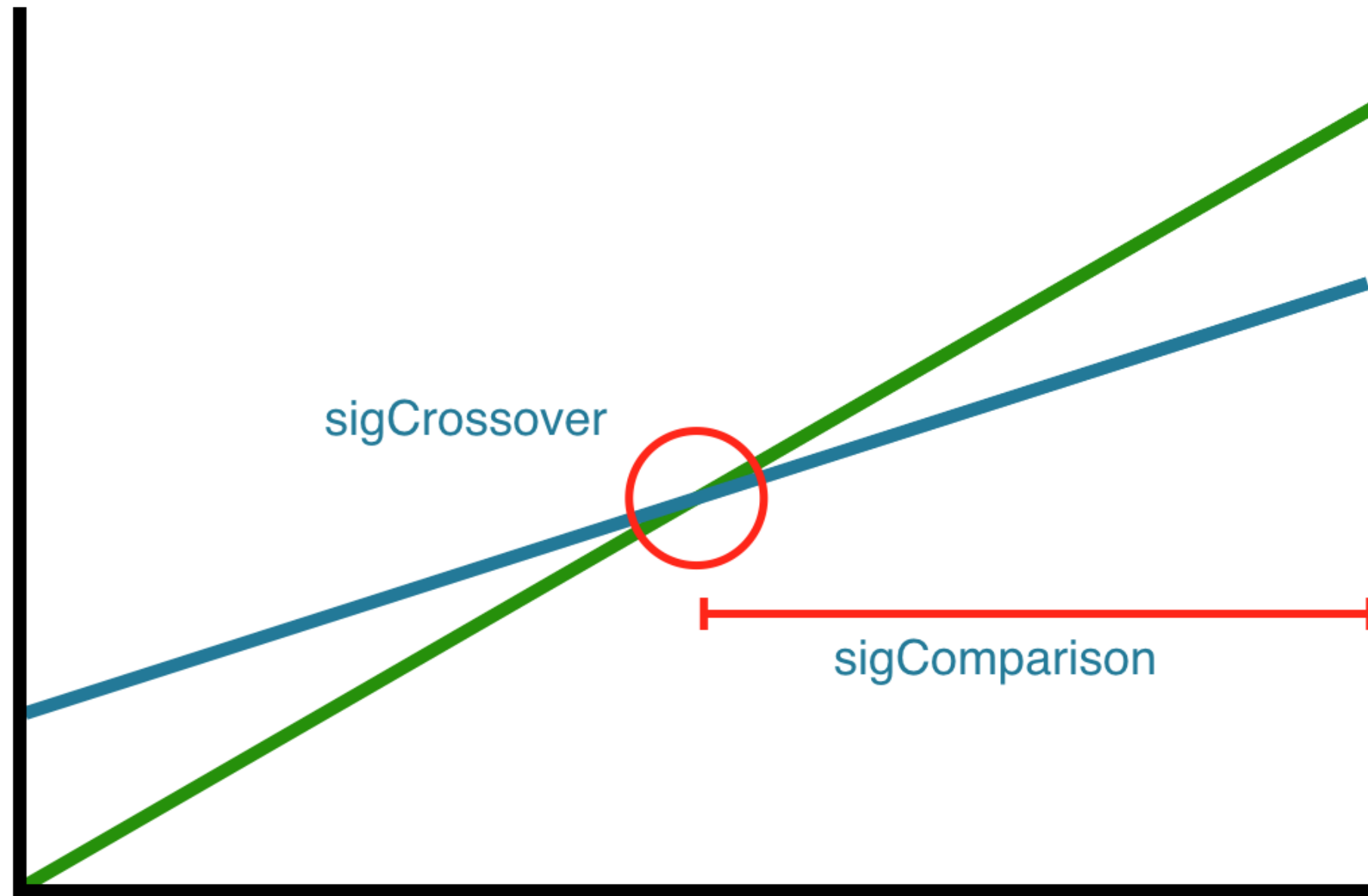
- “gt”, “lt”, “eq”, “lte”, “gte”

Structure

```
add.signal(strategy.st, name = "sigCrossover",  
            arguments = list(columns = c("SMA50", "SMA200"),  
                              relationship = "gt"),  
            label = "longfilter")
```

```
add.signal(strategy.st, name = "sigComparison",  
            arguments = list(columns = c("SMA50", "SMA200",  
                                          relationship = "lt" ),  
            label = "filterexit")
```

Examples



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sigThreshold

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About sigThreshold

- deals with bounded indicators interacting with critical (and usually fixed) values
- Examples:
 - when the DVO crosses under 20
 - on indicator with running probability value (between 0 and 1)
 - on rolling ratio's that center on 0

Structure

```
add.signal(strategy.st, name = "sigThreshold",  
            arguments = list(column = "str1",  
                              threshold = 20,  
                              cross = TRUE,  
                              relationship = "lt" ),  
            label = "siglabel")
```

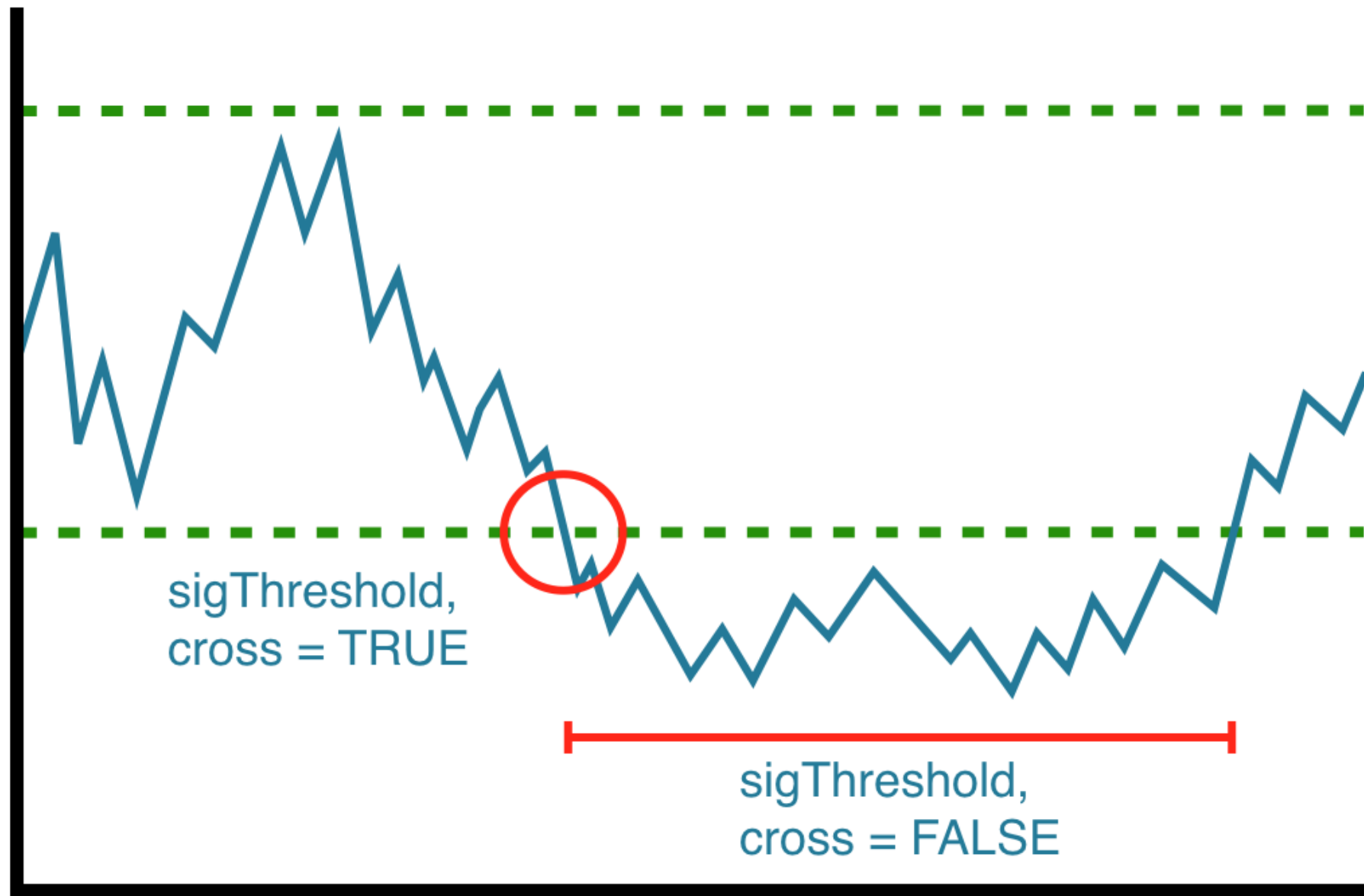
- `cross = TRUE` mimics `sigCrossover`
- `cross = FALSE` mimics `sigComparison`

Examples

```
add.signal(strategy.st, name = "sigThreshold",  
            arguments = list(column = "DVO_2_126",  
                              threshold = 20,  
                              cross = FALSE,  
                              relationship = "lt"),  
            label = "thresholdfilter")
```

```
add.signal(strategy.st, name = "sigThreshold",  
            arguments = list(column = "DVO_2_126",  
                              threshold = 80,  
                              cross = TRUE,  
                              relationship = "gt"),  
            label = "thresholdfilter")
```

Examples



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sigFormula

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About sigFormula

- Catch-all signal allowing for combinations of signals
- Uses string evaluation
- Example:
 - ONLY act upon oscillator signaling if favorable market environment (50-day SMA above 200-day SMA)
 - make sure to buy a temporary pullback, not a large decline

Structure

```
add.signal(strategy.st, name = "sigFormula",  
            arguments = list(formula =  
                             "statement1 & statement2",  
                             cross = TRUE),  
            label = "yourlabel")
```

- Base R: if(statement 1 and statement 2)

```
add.signal(strategy.st, name = "sigFormula",  
            arguments = list(formula = "regular logical  
                                   statement inside an if  
                                   statement", cross = TRUE),  
            label = "yourlabel")
```

Example

```
add.signal(strategy.st, name = "sigFormula",  
            arguments = list(formula = "longthreshold &  
                                longfilter", cross = TRUE),  
            label = "longentry")
```

- make sure that the columns in the logical statement are in the strategy prior to the `sigFormula` signal call

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