

## Metrics

The `SimulationResult` object provides the following metrics (usually defined as `val result = zombieInvasion(...)` in a `ScalaTask`). Some of the metrics are time series, and can thus be aggregated via a temporal step parameter named `by`. The default value for `by` is 20. It means that the 500 steps of these time series are sampled by the fixed step width defined through `by` (for convenience and size of output data).

### Agent-related indicators

- `humansDynamic`(`by`: `Int` = 20): `Array[Int]` sampled time series (each by time steps) of humans
- `walkingHumansDynamic`(`by`: `Int` = 20): `Array[Int]` sampled time series of walking humans
- `runningHumansDynamic`(`by`: `Int` = 20): `Array[Int]` sampled time series of running humans
- `zombiesDynamic`(`by`: `Int` = 20): `Array[Int]` sampled time series of zombies
- `walkingZombiesDynamic`(`by`: `Int` = 20): `Array[Int]` sampled time series of walking zombies
- `runningZombiesDynamic`(`by`: `Int` = 20): `Array[Int]` sampled time series of running zombies

### Event-related indicators

- `rescuedDynamic`(`by`: `Int` = 20): `Array[Int]` sampled time series of rescued humans
- `killedDynamic`(`by`: `Int` = 20): `Array[Int]` sampled time series of killed zombies
- `zombifiedDynamic`(`by`: `Int` = 20): `Array[Int]` sampled time series of zombified humans
- `fleeDynamic`(`by`: `Int` = 20): `Array[Int]` sampled time series of humans fleeing from zombies
- `pursueDynamic`(`by`: `Int` = 20): `Array[Int]` sampled time series of zombies pursuing humans
- `humansGoneDynamic`(`by`: `Int` = 20): `Array[Int]` sampled time series of humans who left the world
- `zombiesGoneDynamic`(`by`: `Int` = 20): `Array[Int]` sampled time series of zombies who left the world

### Global indicators

- `totalZombified`: `Int` total number of zombified humans over the course of the simulation
- `halfZombified`: `Int` time at which half of humans are zombified
- `peakTimeZombified`(`window`: `Int` = 20): `Int` time at which the zombification is the most intense (smoothed over a window size `window`)
- `peakSizeZombified`(`window`: `Int` = 20): `Int` number of zombification when zombification is the most intense (smoothed over a window size `window`)
- `totalRescued`: `Int` total number of humans rescued
- `halfTimeRescued`: `Int` time at which half of the humans have been rescued
- `peakTimeRescued`(`window`: `Int` = 20): `Int` time at which rescue is the most intense (smoothed over a window size `window`)
- `peakSizeRescued`(`window`: `Int` = 20): `Int` number of rescue at the time of `peakTimeRescued`

### Spatial indicators

- `spatialMoranZombified`: `Double` spatial autocorrelation of the location of zombification events cumulated over time. Takes values between -1 (strongest negative autocorrelation) 0 (no spatial autocorrelation) and 1 (strongest autocorrelation)
- `spatialDistanceMeanZombified`: `Double` average distance between zombification events
- `spatialEntropyZombified`: `Double` entropy of zombification events, or how zombification is uniformly distributed across cells ( $\in [0;1]$ )
- `spatialSlopeZombified`: `Double` level of aggregation of zombification events, can be interpreted as "clustering" intensity