Analyzer

The Analyzer extracts travel times form matched GPX files, analyzes them and estimates travel times.

Usage

```
analyzer [OPTIONS]+
 Options:
       --db=VALUE             path to the travel times database
       --add                  adds specified tracks to the DB
       --track=VALUE          path to the matched GPS track to process or
                              to the directory to process
       --map=VALUE            path to the routable map
   -a, --analyze              analyzes travel times from the database
   -o, --output=VALUE         path to the output directory
   -h, -?, --help
```

To extract travel times from the matched GPX tracks use

```
analyzer --db=PATH_TO_TRAVELTIMES_DB
         --add --track=PATH_TO_MATCHED_GPS_TRACK(S)
```

To analyze travel times use

```
analyzer --db=PATH_TO_TRAVELTIMES_DB --map=PATH_TO_ROUTABLE_MAP
         --output=OUTPUT_PATH --analyze
```

Config

Several constants, that affect algorithm behavior, are defined in the "Analyzer.exe.config" file.

`ModelResolution` `[minutes]`
Time resolution of the model

`MinimalModelDelayDifference` `[%]`
Minimal difference between adjacent traffic delays. If the difference is lower, the delays are considered the same.

`MinimalClusterSize` `[-]`
Minimal number of travel times in the cluster during traffic delay estimation.

`ClusterSizePercentage` `[%]`
Percentage of travel times in the cluster during traffic delay estimation. Actual number of travel times, that form a cluster, is MAX(MinimalClusterSize, ClusterSizePercentage * TravelTimesCount)

`ClusterAnalysisStopPercentage` `[%]`
Cluster analysis runs more times with several settings - from the specialized ones to more generic. If number of travel times in clusters reaches the ClusterAnalysisStopPercentage the analysis stops and more generic settings aren't used.

`MaximalAllowedStopLength` `[minutes]`

Maximal allowed stop length. If any stop in travel time exceeded this value, travel time isn't used in analysis.

`FreeflowMinimalCount` `[-]`

Minimal number of travel times used to estimate free-flow time. If segment hasn't enough travel times, model isn't created.

`FreeflowPercentage` `[%]`

Percentage of travel times to estimate free-flow time. Actual number of travel times used is MAX(FreeflowMinimalCount, FreeflowPercentage * TravelTimesCount)

Output

Analyzer creates a model for each road segment that describes travel time. Model is time dependent - τ.

$$T(\tau) = T_{ff} + D_c(\tau) + \|D_{ts}\|_p$$

$T(\tau)$	Travel time on segment at the time τ
T_{ff}	Free flow travel time
$D_c(\tau)$	Delay caused by congestion / heavy traffic at the time τ
$\|D_{ts}\|_p$	Delay caused by traffic signals that occurs with probability p

Sample Output

```
<model node-from="322596181" node-to="322596171" way="29322860"
       freeflow="60.1" avg-delay="9.3"
       signals-delay="53.3" signals-prob="0.75">
  <traffic-delay from="04:30:00" to="05:30:00" day="Any" delay="8.8" />
  <traffic-delay from="05:30:00" to="08:45:00"
                 day="Monday,Tuesday,Wednesday,Friday,Weekend" delay="8" />
  <traffic-delay from="05:30:00" to="08:45:00" day="Thursday" delay="18" />
  <traffic-delay from="08:45:00" to="11:45:00" day="Any" delay="6" />
  <traffic-delay from="13:45:00" to="21:15:00" day="Any" delay="10.2" />
</model>
```