παντα ρεί Panta rhei Mapping motion patterns

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Research topics: Mapping of dynamics – Large scale mapping and localisation – 3D percpetion

Circular-Linear Flow Field map (CLiFF-map)

Circular Linear Flow Field (CLiFF) map

Semi-Wrapped Gaussian Mixture Model

CLiFF-map associates a Gaussian mixture model to each location whose components encode multiple weighted flow directions. The model captures the dependency between motion speed (a linear variable) and direction (a circular variable) a using semi-wrapped Gaussian mixture model (SWGMM).

CLiFF-map – pedestrian example





 Data interpolation

 Interpolation procedure:

 1. Compute distribution for all •

Velocity measurements for 25.08.2009. Arrows are A visualisation of CLiFF-map for the same data. The A visualisation of *motion probability*, the colours corcoloured based on their orientation, and the lengths distance between locations is 0.5 m and the discretisa- respond to how often motion was observed in each loare proportional to the speed. tion radius is also 0.5 m. cation.

Map reconstruction with Monte Carlo approach

A map reconstructed with MC.

A trust map representing the confidence per location in A stability map for Monte Carlo reconstructed map. the map for MC reconstruction.

Map reconstruction with Nadaraya Watson approach



- known locations.
- 2. Generate virtual observations.
- 3. Fit SWGMM to the virtual observations.
- 4. Repeat steps 2 and 3 for all unexplored locations

A trust map representing the confidence per location in A stability map for Monte Carlo reconstructed map. the map for MC reconstruction.

Conditional Transition map (CTMap)



CTMap of a roundabout.





The CTMap is a grid-based representation, which models transitions of dynamic obects in the environment.

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 X_{goal}

Other Activities

Large scale mapping and localisation for social robots



State-Space Gaussian Mixture Model – prior for MCL

CLiFF-RRT (with Luigi Palmieri)





