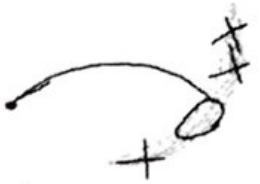
P final

Efficiency of FastSLAM

- Proposal distribution

"FastSLAM 1.0" → "FastSLAM 2.0"
("Probabilistic Robotics book") modifies proposal distribution (The observations are taken into account)



- Map management

M particles
N map features (landmarks)

$O(MN)$

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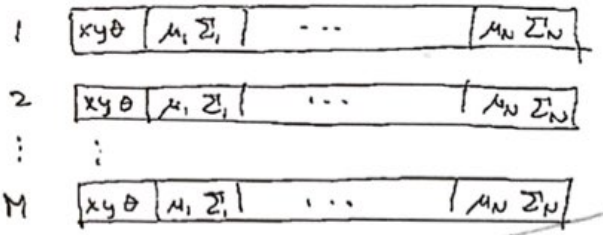
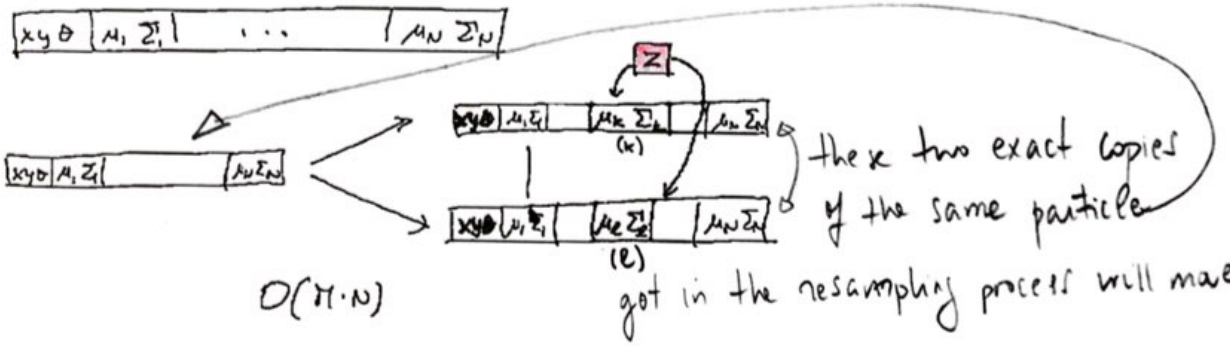
The problem of the presented fast slam approach is that our proposal is only made based on the given control and this may lead to inefficiencies because if the control is very noisy this may lead to the widespread of the particles and only a few will survive in the end, because all the others do not fit very well into the observations of our robot.

Each $z_t = \begin{bmatrix} \check{D}_t \\ \check{\Phi}_t \end{bmatrix}$ got in the scan

Implementation: $O(MN)$





$O(M \cdot N)$

got in the resampling process will move differently in the prediction step, which won't modify the map. When the observation occurs they will be updated differently. This measurement z relates to an existing landmark in one particle, let's say landmark k, and another landmark, landmark ℓ, in the other particle. If this particles are close, these indices, probably, are the same $\Rightarrow k = \ell$. So we modify the list of landmarks only in one place, where all the other entries stay the same