Technion – Israel Institute of Technology



HW1

Autonomous Navigation and Perception

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# Question 1 – filtering and smoothing

Consider models:

And prior:

## Recursive formulation for posterior over (filtering)

## Smoothing - recursive

We developed in the previous section:

Instead of marginalizing, we will apply the chain rule:

## Smoothing – full solution

From the recursive formulation in the previous section, we can deduce the following:

# Question 2 – Occupancy grid and mapping

Given the map:

We denote:

We also assume an inverse observation model:

## Find posterior

{Assuming: and denoting }

As m has a binary state:

## Log-odds ratio

Hence:

## Posterior over

{Assuming independence between cells }

{Using section ‎a}

# Hands On

We successfully installed *Julia* with the required packages to run and debug the attached code, producing the following image:

Chart, scatter chart

Description automatically generated