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CS549
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HW12

1.
   1. Given a point in motion we can detect its velocity by evaluating its distance traveled over time via Vw = Xw-Xw' / T.
      As point Xw is Xavg($|B|^2$/B*delta) then we can equate Vw to as the average of the world velocity * ($|B|^2$/B*delta) – the original point * change in delta/change in time
      This can be written as
      Vavg(($|B|^2$/B*delta)) – Xw(B*(ddelta/dtime)/B*delta) = Vw

   2.
      Xw = Avg (Xl,Xr)* b^2 /B*delta
      Avg(Xl,Xr) = [0,2t,0,f]
      Xw = [0,2t,0,f]*[delta*b,0,0] - [0,2t,0,f]*[delta*b,0,0]
      Vw = [0,0,0,0]

2.
   1. a)p(x,y) = 2x q(x,y) = 2y
      b)p(x,y) = 2y q(x,y) = 2x
   2. Given rotationally symmetric over reflectance such that x = y at a 90^{o} rotation.
      The above equations are equivalent such that if x' = y and y' = x
      c)p(x',y') = 2x' = 2y q(x',y') = 2y' = 2x
      d)p(x',y') = 2y' = 2x q(x',y') = 2x' = 2y
      here the equation c is equivalent to equation b and a equal to d
3. The vector Xk has two parts that of the pose xvk and set of map locations m.
   As Pk-1|k-1 = [[Pvv Pvm][PvmT Pmm]
   and Pk|k-1 = ∇f x P k−1|k−1 ∇f x T + ∇f u U k ∇f u T
   where ∇fvx = ∂fv/∂xvk-1 and ∇fvu = ∂fv/∂uk,
   The pose only changes relative to Pk|k-1 in terms of v, m.
   Pvv is equivalent to Pk|k-1 in terms of Pk-1|k-1.
   and Pmm is equivalent to Pmm in terms of Pk-1|k-1
   As Pvm and Pmv are relative to the pose of a robot it is scaled to ∇fvx (transpose for Pmv)
   Therefore the covariance prediction must simplify to

   Pk|k-1 = [[∇f x P k−1|k−1 ∇f x T + ∇f u U k ∇f u T ∇fvxPvv,k−1|k−1],
   [P Tvv,k−1|k−1∇fvxT Pmm,k−1|k−1]]