Journal Watch: IEEE Transactions on Wireless Communications, August 2015

Mohit Sharma

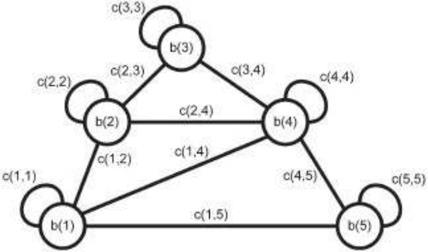
Signal Processing for communications Lab.
Department of ECE, IISc

August 29, 2015

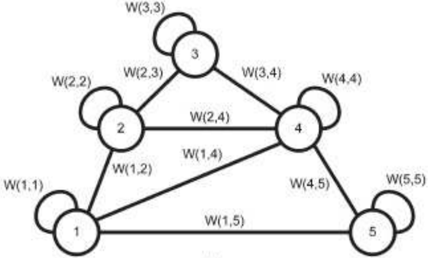
- Data Collection in Sensor Networks via the Novel Fast Markov Decision Process Framework

  Authors: T. Duong and T. Nguyen

System Model



(a)



(b)

Benefits and costs at node can change abruptly

- *Goal:* To find a randomized optimal policy that maximizes the average reward in non-stationary environment.
- Policies found using value iteration or policy iteration may be suboptimal!
- Alternative formulation

$$\max \gamma \sum_s \pi(s) \sum_i p(s,i)\mathcal{R}(s,i) + (1-\gamma)(1-\mu(\mathbf{P}))$$

$$\text{s.t.} \quad \theta \geq 0, \sum i = 1^n \theta_i = 1$$

- Solved using projected sub-gradient methods.

- Online Sequential Channel Accessing Control: A Double Exploration vs. Exploitation Problem

  Authors: P. Yang, B. Li, J. Wang, X. Li, Z. Du, Y. Yan and Y. Xiong

System Model

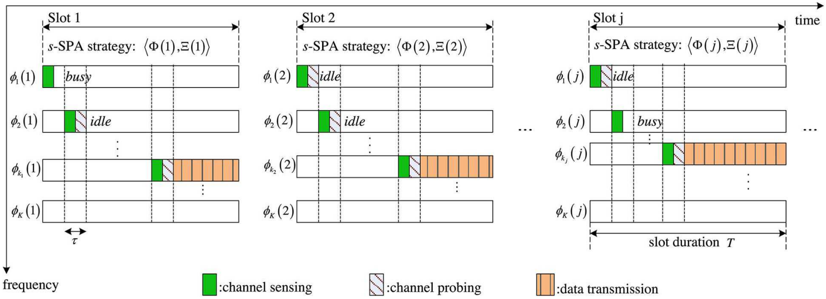


Figure : Online sequential sensing, probing and accessing (s-SPA) control

Algorithm

IE-OSP Policy

Initialize: for all $1 \leq i \leq N$: $\hat{\theta}_i = 0$, $n_i^s = 0$, $\hat{\gamma}_i = 0$, $n_i^p = 0$, $S_0 = \Omega$, $l = 1$, $k = 1$;
while $S_0 \neq \emptyset$ **do**
  Sense a random channel $i \in S_0$;
  $k = k + 1$, update $\hat{\theta}_i(l)$ and $n_i^s(l)$ according to Eqn.(7) and (8), respectively;
  if $a_i(l) == 1$ **then**
    Probe and then access channel i;
    Update $\hat{\gamma}_i(l)$ and $n_i^p(l)$ according to Eqn.(9) and (10), respectively;
    $l = l + 1$, $k = 1$, $S_0 = S_0 \setminus \{i\}$;
  else if $k == K + 1$ **then**
    $l = l + 1$, $k = 1$, $S_0 = S_0 \setminus \{i\}$;
    Wait for next communication slot;
  end if
end while
for $j = l : L$ **do**
  for $m = 1 : M$ **do**
    Select sensing order Φ_m
    for $k = K : 1$ **do**
      Compute $\hat{\Lambda}_k^{m,u}(j)$ with $\left\{\hat{\Theta}^u(j), \hat{\Upsilon}^u(j)\right\}$ according to Eqn. (4) or (5);
      Compute $\Gamma_k^{m,u}(j)$ according to Eqn. (6);
    end for
  end for
  Determine $m^*(j) = \arg\max_{1 \leq m \leq M} \left\{\hat{\Lambda}_1^{m,u}(j)\right\}$;
  Proceed s-SPA with strategy $\langle \Phi_{m^*}(j), \Xi_{m^*}^u(j) \rangle$;
  Update $\hat{\theta}_i(j)$, $n_i^s(j)$, $\hat{\gamma}_i(j)$ and $n_i^p(j)$, according to Eqn.(7), (8), (9) and (10), respectively;
end for

- Renewable Powered Cellular Networks: Energy Field Modelling and Network Coverage

  Authors: K. Huang, M. Kountouris, H. Fu and V. O. K. Li

- **Goal**: To model the energy fields using spatial random processes derived form PPPs and use it for performance analysis.
- **Contributions**
  - Energy intensity function $g(X) = \gamma \max_{Y \in \Theta_e} f(|X - Y|)$ where $f(d) = e^{\frac{-d^2}{v}}$
  - In on-site harvester case
    - With both channel-inversion and channel independent transmissions the outage probability $\downarrow$ with $\psi = v\lambda_e$ and γ in the form of

      $$c\gamma^{-\pi\psi+p}$$

      where p: probability correspoding to flat energy field.
  - Distributed harvester case
    - As the harvester cluster size $\frac{\lambda_h}{\lambda_a}$ increases the power distributed to each BS converges to a constant proportional to the number of harvesters per BS.

Contributions

Results are also extended to two variations of the energy field model characterized by

- shot-noise process

$$g(X) = \gamma \sum_{\gamma \in \Theta_e} f(|X - Y|)$$

- power-law energy decay function.

$$f(d) = (1 + \frac{d^2}{v})^{-1}$$

Other Papers

- "Online parameter estimation for temporal spectrum sensing", *Y Sun, B. L. Mark and Y Epharim*
- "Achievable Rates for Fading Half-Duplex Single Relay Selection Network Using Buffer-aided Relaying", *N. Zlatanov, V. Jamali and R. Schober*
- "D2D Enhanced Heterogeneous Cellular Networks With Dynamic TDD" *Hongguang Sun, Matthias Wildemeersch, Min Sheng, and Tony Q. S. Quek*