

## **Randomized Consensus Algorithms over Large Scale Networks**

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### **Abstract:**

Suppose we have a directed graph  $G$  with set of nodes  $V = \{1, \dots, N\}$  and a measure  $x_i$  for every node  $i \in V$ . The average consensus problem consists in computing the average  $x_A = N^{-1} \sum_i x_i$  in an iterative way, exchanging information among nodes exclusively along the available edges in  $G$ . This problem appears in a number of different contexts since the 80's (decentralized computation, load balancing, clock synchronization) and, recently, has attracted much attention for possible applications to sensor networks (data fusion problems) and to coordinated control for mobile autonomous agents. Several algorithms for average consensus can be found in the literature: they differentiate on the basis of the amount of communication and computation they use, on their scalability with respect to the number of nodes, on their adaptability to time-varying graphs, and, finally, they can be deterministic or random. In this presentation we will focus on random algorithms: we will review some algorithms present in the literature and we will propose some new ones. We will present some performance results which will allow us to make some comparison. Finally, we will establish some probabilistic concentration results which will give a stronger significance to previous results.

### **About the Speaker:**

Fabio Fagnani received a Laurea degree in Mathematics from the University of Pisa and Scuola Normale Superiore in 1986, and a PhD in Mathematics from the University of Groningen in 1991. From 1991-1998 he was an Assistant professor at the Scuola Normale Superiore. In 1997 he held a position of visiting professor at MIT. Since 1998 he has been with the Politecnico di Torino where he is currently Full Professor of Mathematical Analysis. His research activities are on the fundamental mathematical aspects of Systems and Control theory and of Coding theory. Specific themes of current interest are: control under communication constraints and coordinated control, consensus algorithms for large scale networks, ensemble of codes over groups and their use in high performance schemes.

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