

# Ravishankar Krishnaswamy

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EDUCATION	<b>Carnegie Mellon University</b> , Pittsburgh, PA Ph.D Candidate, Computer Science Department - Advisor: Anupam Gupta  <b>Indian Institute of Technology</b> , Madras, India Bachelor of Technology, Computer Science Department - Advisor: C. Pandu Rangan	Aug 2007 -    Aug 2003 - May 2007
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INTERESTS	Approximation Algorithms, Combinatorial Optimization, Algorithmic Game Theory.
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PUBLICATIONS AND MANUSCRIPTS	<ul style="list-style-type: none"><li>• <i>Online and Stochastic Survivable Network Design</i>: Submitted to STOC. Joint work with Anupam Gupta and R. Ravi.</li><li>• <i>Scheduling with Outliers</i>: Manuscript. Joint work with Anupam Gupta, Amit Kumar and Danny Segev.</li><li>• <i>Non-cooperative Bundling Games</i>: Manuscript. Joint work with C. Pandu Rangan, Ravi Sundaram and Aravindan Vijayaraghavan.</li></ul>
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RESEARCH EXPERIENCE	<b>Computer Science Department, Carnegie Mellon University</b> <b>Graduate Research</b>	Oct, 2007 -
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My research has broadly been in the design of efficient approximation algorithms. More specifically, I have focused on the following problems:

**Online and Stochastic Network Design:** We look at designing *online* algorithms (where the demand is revealed incrementally) and *cost sharing* schemes for the survivable network design problem. Cost sharing schemes are useful in the context of mechanism design and also as a tool for solving problems with stochastic demands. In work under submission, we have designed an online algorithm with poly-logarithmic competitive-ratio, which also implies cost sharing schemes with similar approximation guarantees. When the graph is a complete metric, we have constant factor cost sharing schemes.

**Scheduling with Rejection:** Given a cost function (like makespan, weighted sum of completion times, or average flow time), we consider the problem of choosing a small fraction of jobs to reject and scheduling the others to minimize the total cost. We have obtained almost tight approximation guarantees for several common scheduling objectives.

**Stochastic Optimization with Probing:** In ongoing work, we consider the problem of stochastic optimization with probing — there is uncertainty in the demand, but the algorithm designer can probe some of clients to obtain information about their requirements. The goal is to choose the right subset of jobs to probe so that the expected cost of the solution is minimized. We have designed constant factor approximation algorithms for the vertex cover and bin packing problems.

## College of Comp. and Info. Sciences, Northeastern University

### Summer Research Internship

*May, 2006 - July, 2006*

Worked with Prof. Ravi Sundaram on the problem of bundling goods to maximize revenue. Given a  $m \times n$  valuation matrix, the problem is to partition the  $n$  goods into bundles and price the bundles so as to maximize total revenue, under the model that a buyer buys a bundle if the sum of his valuations of the products in the bundle exceeds the assigned price. We obtained NP-hardness results and approximation algorithms for the basic bundling problem and some variants. We also modeled it in a game theoretic framework and analyzed the existence of Nash equilibria. The manuscript is available at <http://www.cs.cmu.edu/~ravishan/papers/bundling.pdf>

## Department of Computer Science and Engineering, IIT Madras

### B.Tech Thesis

*Dec, 2006 - Apr, 2007*

Worked with Prof. C. Pandu Rangan on designing centralized network coding schemes which attain optimal throughput under edge failures: The failure model we assumed was that any one out of polynomially many specified failure patterns can potentially fail. The thesis is available at <http://www.cs.cmu.edu/~ravishan/papers/btech.pdf>

### RELEVANT COURSES

#### Carnegie Mellon University

Advanced Approximation Algorithms, Iterative Rounding and Relaxation, Machine Learning Theory, Probabilistic Combinatorics\*, Complexity Theory\*, Networks and Matchings. (\**this semester*)

#### IIT Madras

Randomized Algorithms, Advanced Operations Research, Graph Theory, Linear Algebra, Topology.

### AWARDS AND HONORS

- Ranked **2<sup>nd</sup>** among all students in the Computer Science Department, IIT Madras.
- Secured **11<sup>th</sup>** place in the 2006 ACM-ICPC Asia Regional Programming Contest Finals.

### MISCELLANEA

- Organized the first ever IIT Madras online programming contest in 2006; Designed and implemented an online automated judge system for the same.

### REFERENCES

Anupam Gupta  
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