

Python Simulation

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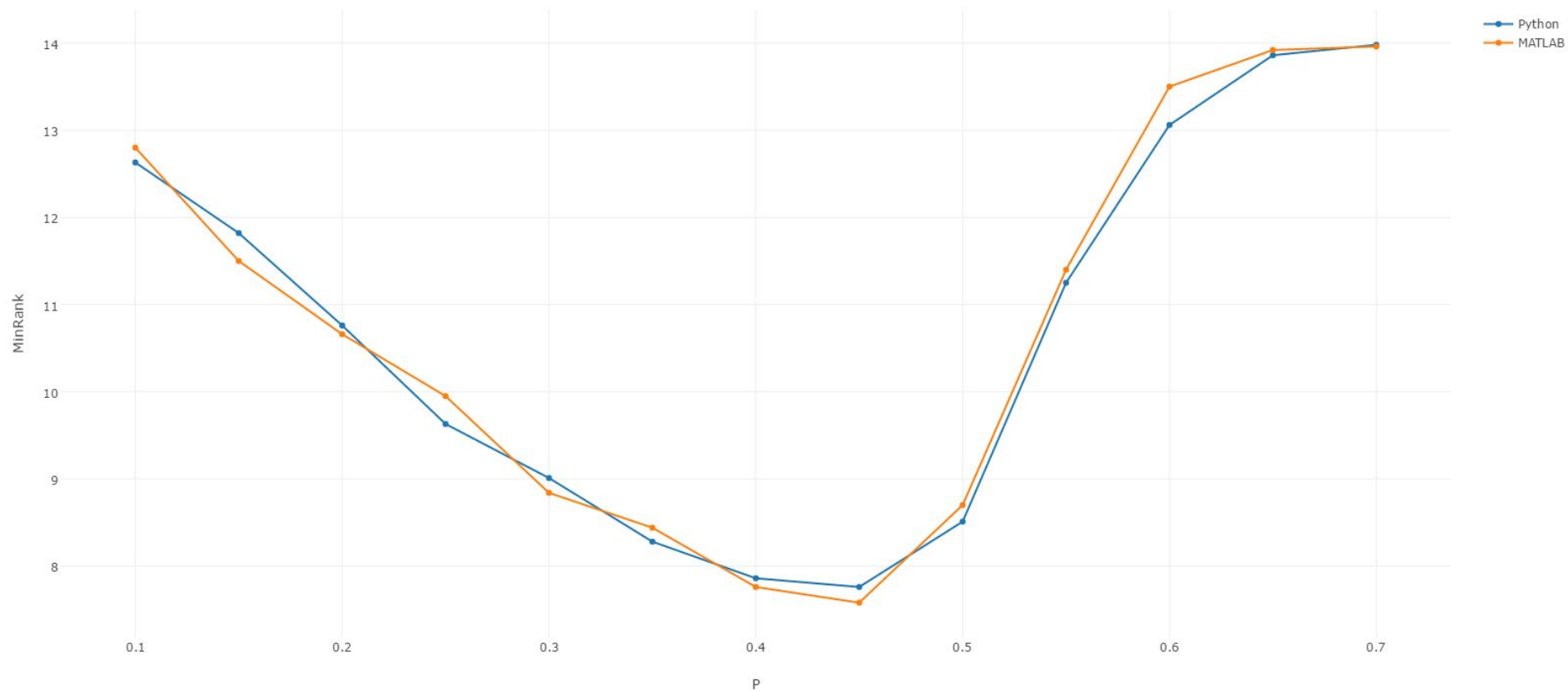
What Was Implemented?

- Directional SVD AP Index Coding
- SVD based encoding and decoding scheme
- Round Robin comparison sending

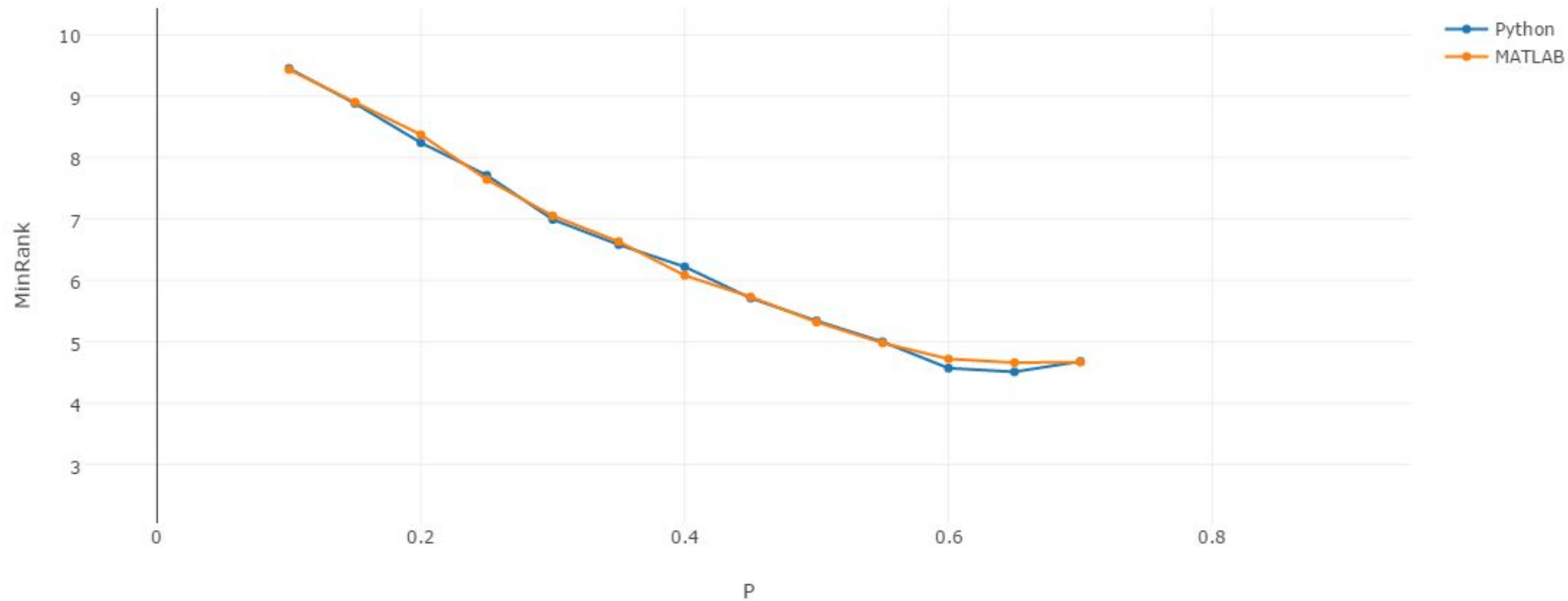
Directional SVD APIC

- Translated MATLAB version to Python
- Results almost exactly the same as MATLAB algorithm

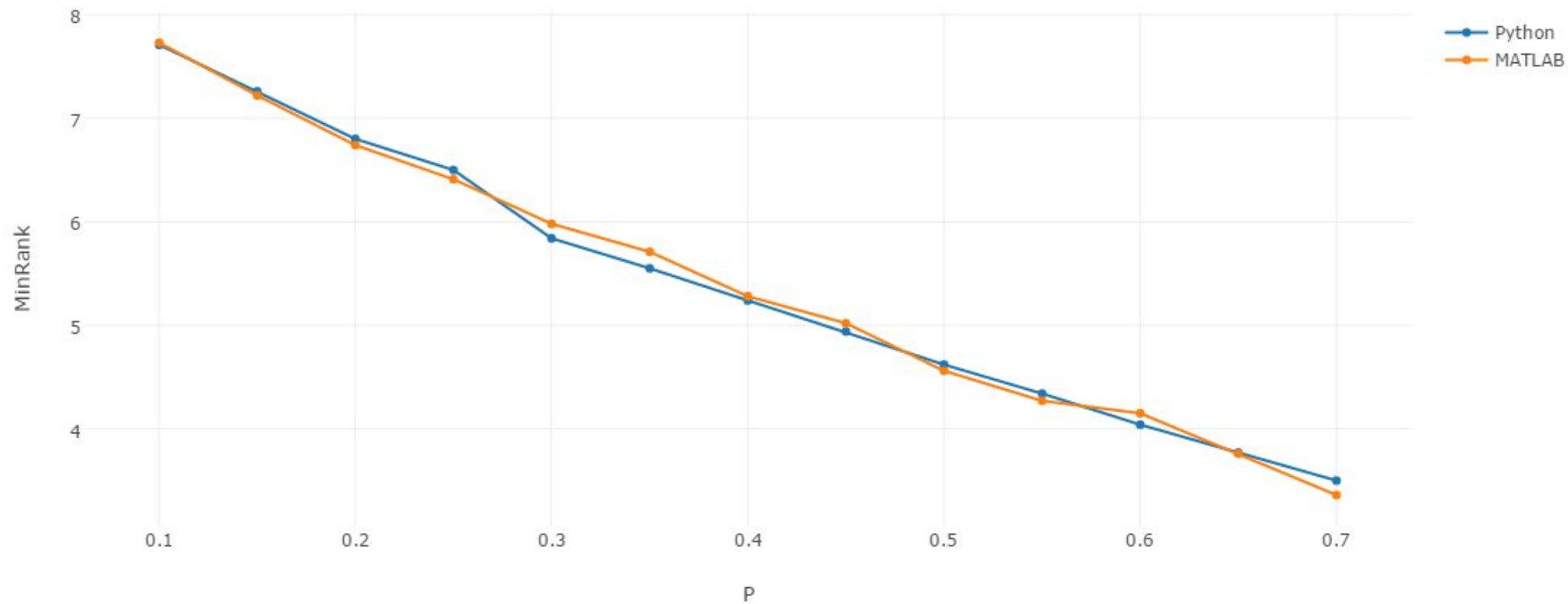
Python VS MATLAB AP Index Coding for 14x14 Matrix



Python VS MATLAB AP Index Coding for 10x10 Matrix



Python VS MATLAB AP Index Coding for 8x8 Matrix



SVD based Decoding

- Encoded X vector of messages using SVD
- Decoded X vector of messages using M using SVD
- Based off of Muryong's implementation

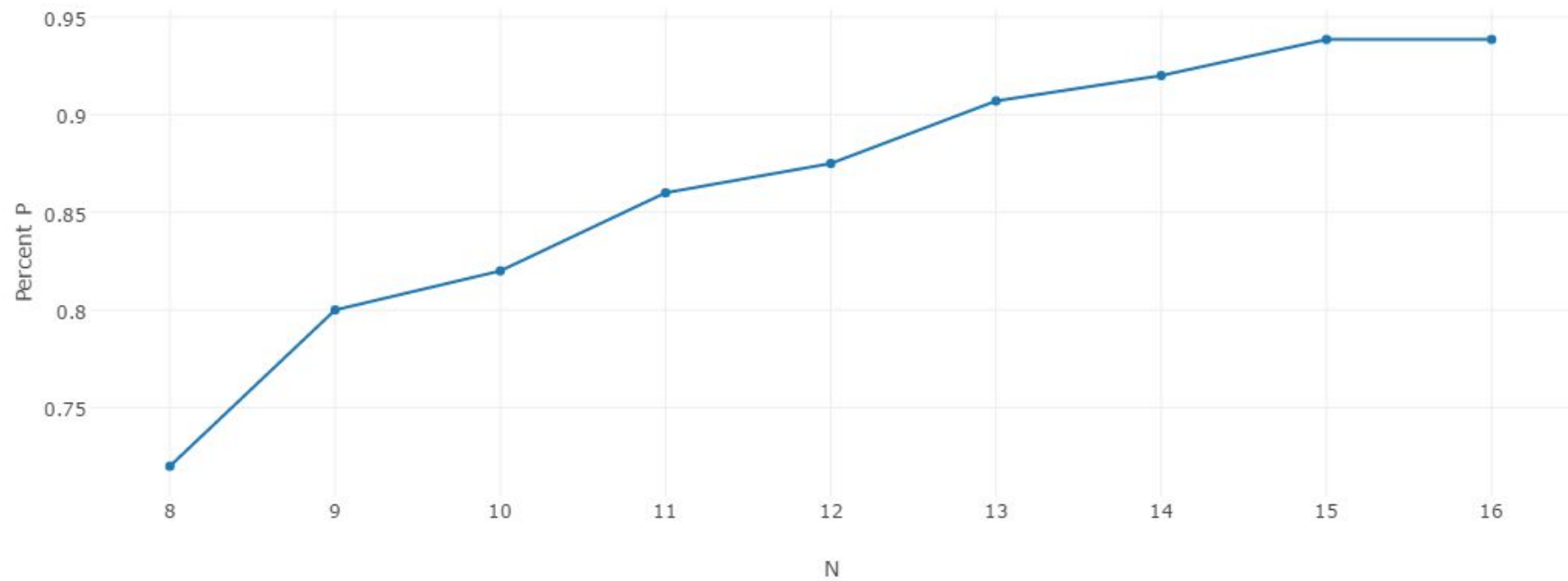
Testing Simulation

- Initially tested Round Robin(RR) VS AP Index Coding(APIC) with incremented Probabilities(P) for receiving messages
- RR performed much better than APIC with this method
- APIC required sending encoded X vector and M to all receivers which meant more messages had to be sent for everyone to have all of X and M

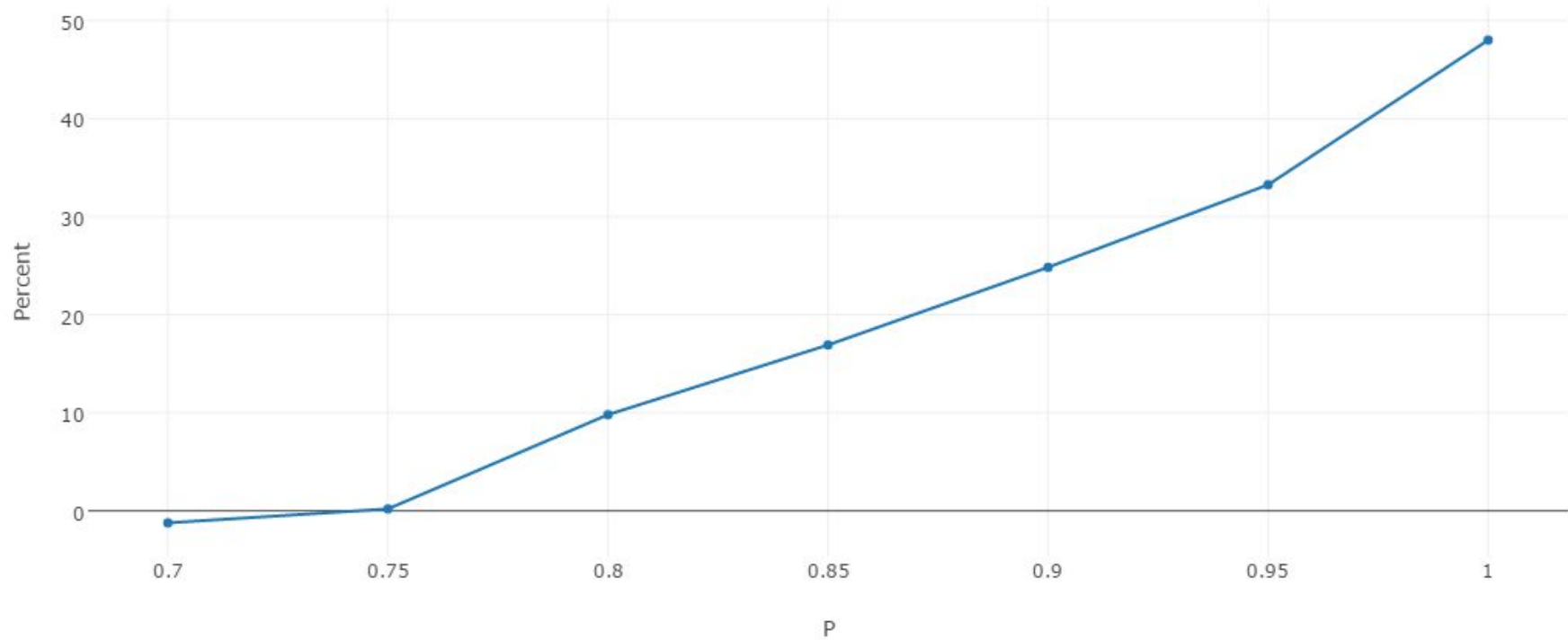
Testing Simulation Continued

- Changed simulation to help find threshold of when APIC beat RR
- Found optimal probability of side information to yield lowest min rank for APIC
- Found second optimal probability of transmission chance to outperform RR
- For APIC to beat RR, P had to be different for initial message broadcast and X/M message broadcast

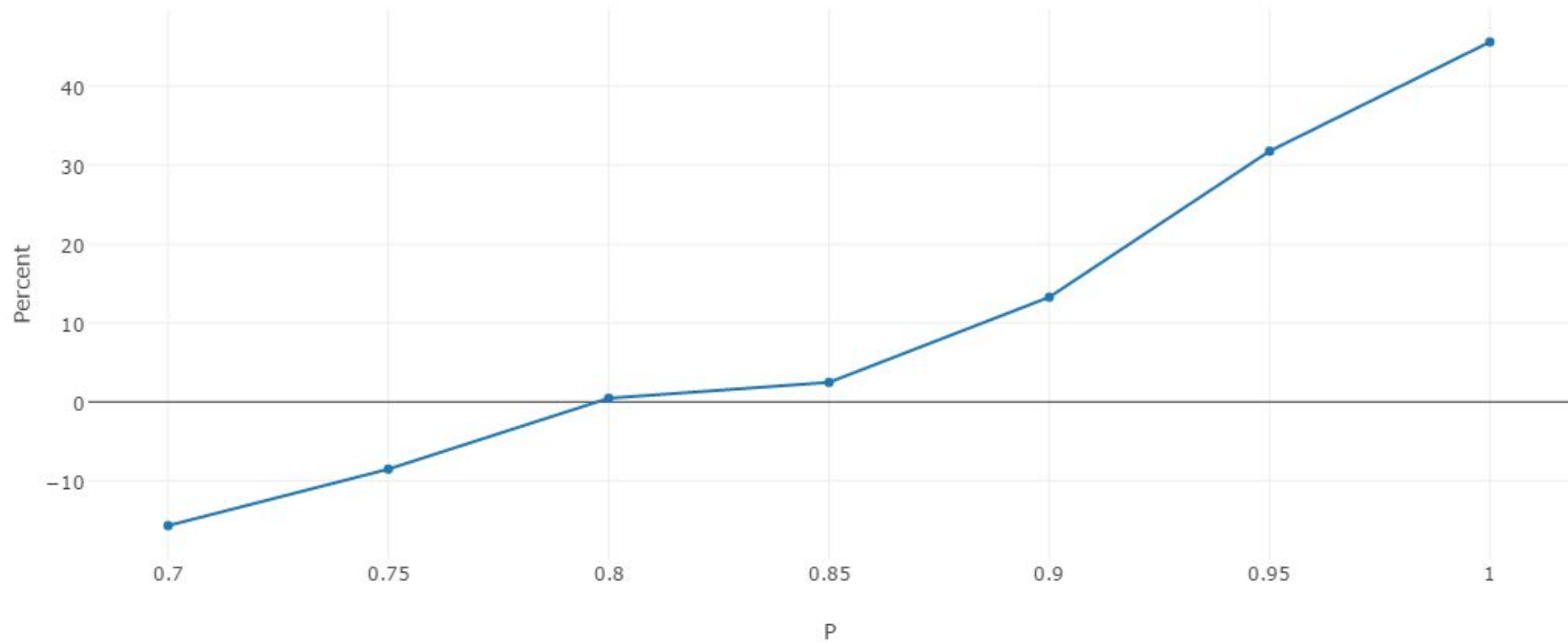
Threshold for Gain Per N size



Increased ThroughPut For 8x8 Matrix Per Probability



Increased ThroughPut For 10x10 Matrix Per Probability



Gain Per N size Matrix with Initial Prob .4 and Regular P of .95

