1001 Inter Group Meeting (Temp)

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Global Setting

- Objective function with the third term

- 50 seeds on $ER(500, 0.5)$ for testing with fixed number of initialization (10 by default), and 10 seeds on $ER(500, 0.5)$ for testing with fixed time.

- Maximum iteration set to 1500 for fixed initialization testing and 150 for fix time testing.

Scipy and Handcraft L-BFGS

- Comparison by solution size: (L-BFGS-B indicates Scipy's solver)

	L-BFGS-B	Handcraft L-BFGS-B
Average solution size	11.26	10.78

- Comparison by iteration number/time:

	L-BFGS-B	Handcraft L-BFGS-B
Average iteration number	167.1	23.05
Average time	0.7411	0.1991* (median 0.0569)

Outlier Case

- In seed 43, we have one run taking much more steps

```
init  3 → MIS size  9, iters  1651, time 21.4177s
```

Handcrafted better than Scipy

- Skipped Cauthy point?

- Cheaper line search? Larger initial steps?
  (Strong Wolfe in Scipy vs Armijo in ours)

How Useful is Cauthy Point?

- Without Cauthy point and with Cauthy point on the same instance $ER(500, 0.5, seed = 0)$ with max iteration 1500 for a 10 initializations testing.

	Without Cauthy Point	With Cauthy Point
Best solution size	11	11
Average iteration number	19	315.8
Average runtime	0.0531	0.8783

- Two initializations hitting max iter when using Cauthy point.

Time Limitation Testing

- Comparing Scipy's L-BFGS-B and the handcrafted version (Ours)

	Scipy's L-BFGS-B	Ours
ER(500,0.5), 5 sec	11.1	11.9
ER(1000,0.5), 5 sec	11.2	12.0
ER(1000,0.5), 10 sec	11.6	12.4
ER(2000,0.5), 10 sec	11.8	12.5
ER(2000,0.5), 20 sec	11.8	13.2

CCCP Newton