#### Сверхбольшие задачи оптимизации

Ю.Е. Нестеров<sup>1</sup>

PremoDay2, МФТИ, 5 октября 2013г.

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But: We have started this two years ago.



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Main hope: Sparsity. Main tools: Right methods.



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### Sparse problems

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Expected acceleration:  $(10^{-6})^2 \Rightarrow 1 \text{sec} \approx 32000 \text{ years!}$ 



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Big change in modelling: Max-type functions.

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Let  $E \in \mathbb{R}^{N \times N}$  be an incidence matrix of the connections graph. Denote  $e = (1, \dots, 1)^T \in \mathbb{R}^N$  and  $\bar{E} = E \cdot \text{diag}(E^T e)^{-1}$ .

**Known:**  $\sigma_i$ , the set of friends of agent i.

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# Google problem: rank the agents by social weights

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Time for  $10^4$  iter. (p=32)

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N	$\kappa(A)$	$GM_s$	GM
1024	1632	3.00	2.98
2048	1792	3.36	6.41
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 $1 \sec \approx 100 \text{ min!}$ 

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