Brief Announcement: Distributed Derandomization Revisited

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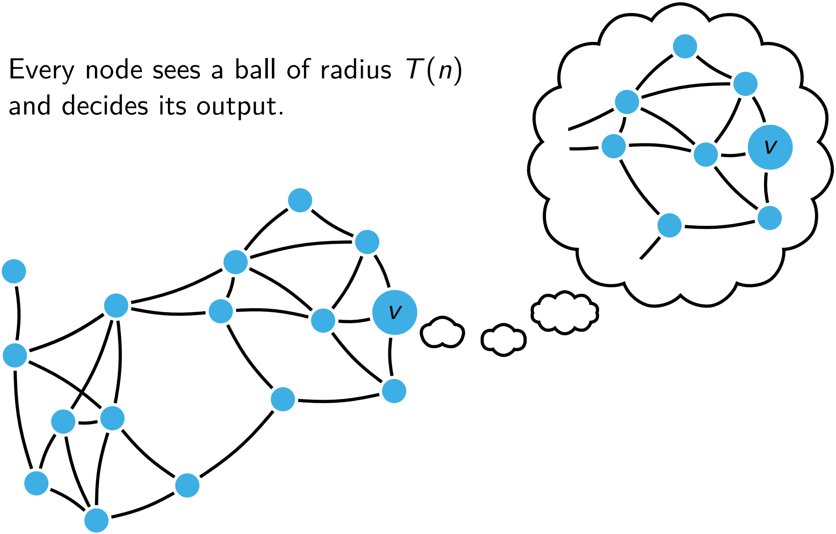
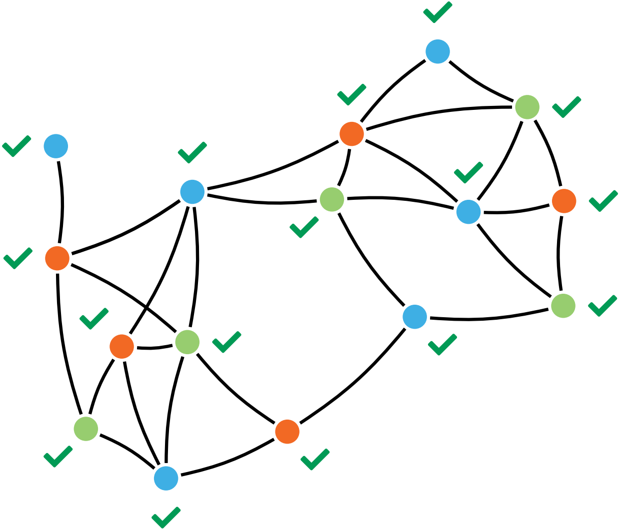
The LOCAL model

Every node sees a ball of radius $T(n)$ and decides its output.



Locally checkable labeling problems (LCLs)



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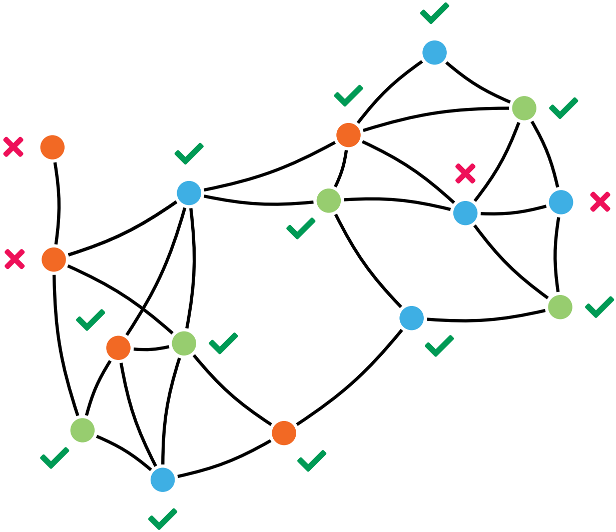

Prior work and limitations

Theorem (Chang, Kopelowitz, and Pettie[1])

Let $\mathcal{A}_{\mathsf{rand}}$ a randomized LOCAL algorithm solving an LCL problem and ***that uses at most*** $\mathbf{r(n)}$ ***random bits****.*

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derandomization

$\mathcal{A}_{\text{rand}}$ → $\mathcal{A}_{\text{det}}$

random
$T_{\text{rand}}(n)$ *complexity*

deterministic
$T_{\text{rand}}(2^{n^2})$ *complexity*

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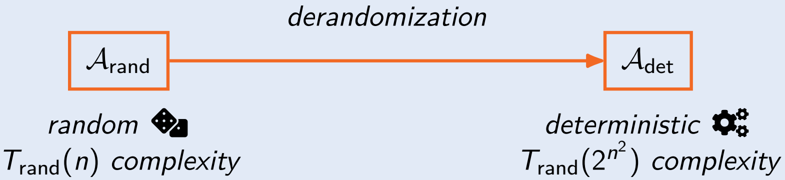
Main result

Theorem

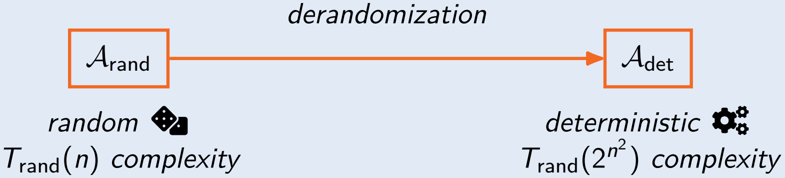
Let $\mathcal{A}_{\text{rand}}$ a randomized LOCAL algorithm solving an LCL ~~and that uses at most $r(n)$ random bits~~.



Main result

Theorem

*Let $\mathcal{A}_{\text{rand}}$ a randomized LOCAL algorithm solving a~~n LCL~~ **component wise verifiable problem** ~~and that uses at most $r(n)$ random bits~~.*



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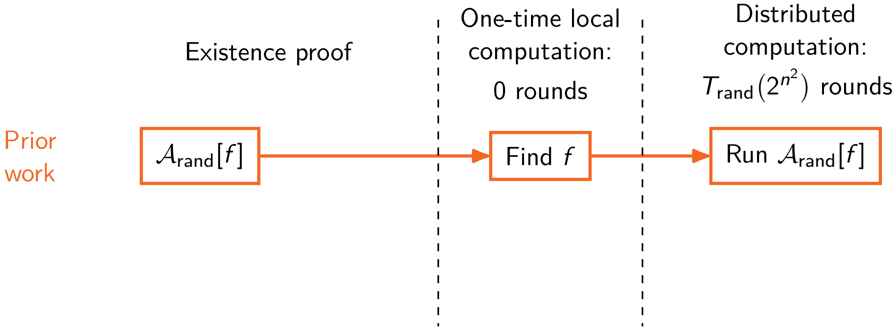

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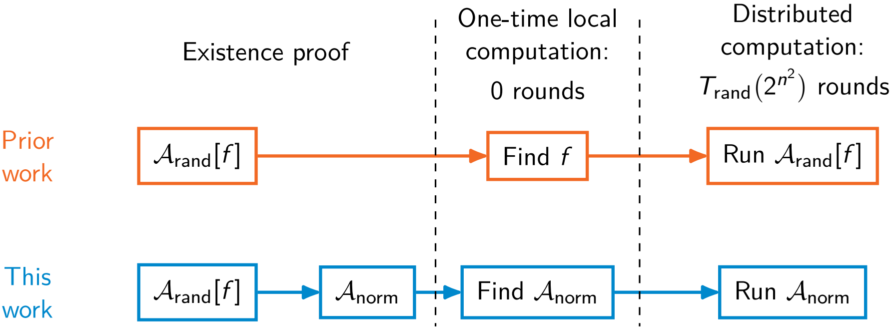
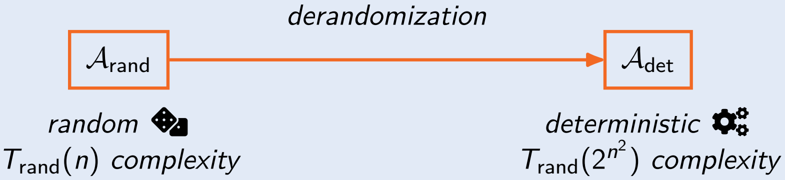


Extensions

Theorem

Let $\mathcal{A}_{\text{rand}}$ a randomized LOCAL algorithm solving an LCL problem on ***connected graphs****.*



Conclusion

- No more annoying bounded number of random bits assumption.
- The new derandomized algorithm is uniform in n.
- Generalization of the original theorem to:
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Thanks for listening!