15210: Parallel and Sequential Data Structures and Algorithms

SegmentLab

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7.1

7.2

Let

Then,

7.3

k = 3

Denote number of vertices with degree i as . We have

Assume that , then , therefore

Contradict with , therefore, the assumption is wrong, that is,

7.4

Assign each edge with a unique random number.

For each edge e, if the two vertices has degrees of:

1,1 => contract and finish the algorithm

1,2 => contract if e is of larger weight

2,2 => contract if weight of e is of larger than any adjacent edges

either of the two is 3 => do nothing

We have proved that

The probability that an edge will get contracted is at least

That is, in each round a fixed fraction of edges ) are expected to be removed.

7.5

Since we would finally get one vertex with no edges, we would do n-1 contractions, making the total work .

Since we contract a fixed fraction, we expect to have rounds, and each round has span of since it is parallel. That is,