

Update

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Outline

Algorithms

Performance evaluation

Possible solutions

Algorithms

- ▶ Split the problem in two stages:
 1. Find maximal disks at each timestamp (MaximalFinder) and
 2. Join maximal disks between adjacent timestamps (FlockFinder)
- ▶ Pseudocode for both algorithms available online: [MaximalFinder](https://tinyurl.com/y741ld5k)¹ and [FlockFinder](https://tinyurl.com/yac26guf)².

¹<https://tinyurl.com/y741ld5k>

²<https://tinyurl.com/yac26guf>

Maximal finder overall steps

1. Indexing points...
2. Getting pairs...
3. Computing centers...
4. Indexing centers...
5. Getting disks...
6. Filtering disks $< \mu$...
7. Prunning duplicate candidates...
8. Indexing candidates...
9. Getting expansions...
10. Finding maximal disks.

Flock finder

1. Set of disks for t_i ...
2. Set of disks for $t_{i+\delta}$...
3. Joining timestams...
4. Checking internal timestamps.

Outline

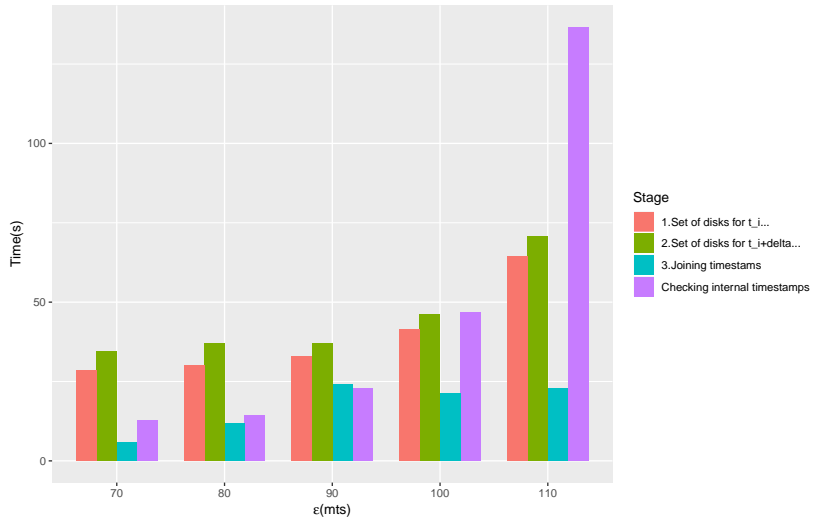
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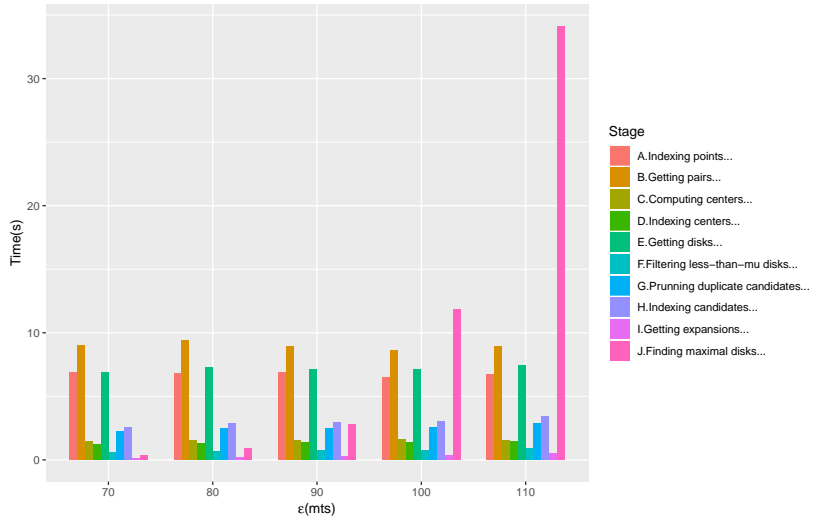
Performance

Execution time Epsilon by Flock Stages...



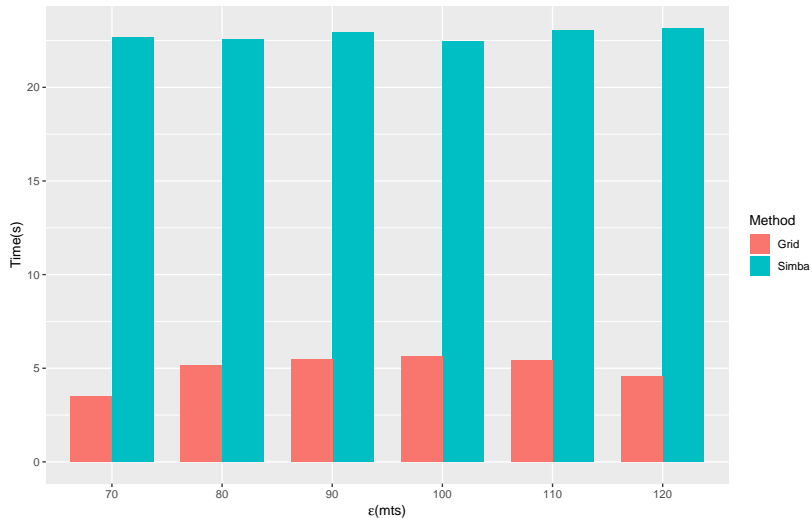
Performance

Execution time Epsilon by Maximal Stages...



Performance

Execution time finding disk's centers...



Bottlenecks

1. In flock finder:

- ▶ Checking internal timestamps: When merge last approach prunes enough points it works as expected but large amount of intermediate points have huge impact.

2. In maximal finder:

- ▶ Finding maximal disks: Even the new implementation is more stable, the most costly operation is removing duplicates and redundant disks.

3. Overall:

- ▶ Online approach requires indexing at each timestamp.
- ▶ Simba indexing is slow.

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Possible solutions

1. Explore alternatives in Simba³

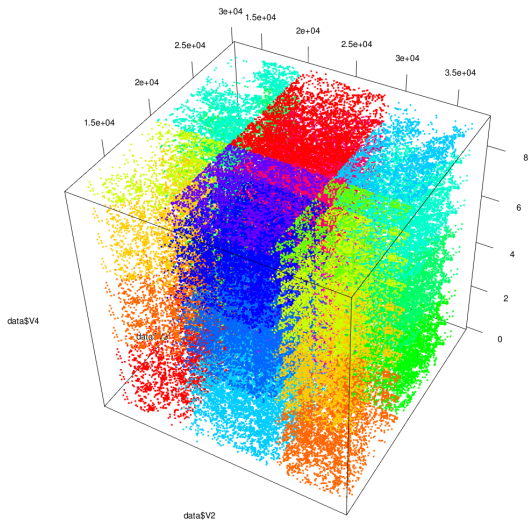
- ▶ There are QuadTree and KDTree partitioners but they are not fully-integrated as indices. (QuadTree only support 2D.)
- ▶ For partitioning, RTree is already faster than QuadTree and KDTree in 2D and 3D datasets.

2. Grid indexing

- ▶ Include the Grid partitioner in Simba and work on its index integration.
- ▶ Implement distance join by my own.

³Already done.

Grid partitioning



Grid partitioning

