SPAdes support for third-party assembly graphs

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Global problem

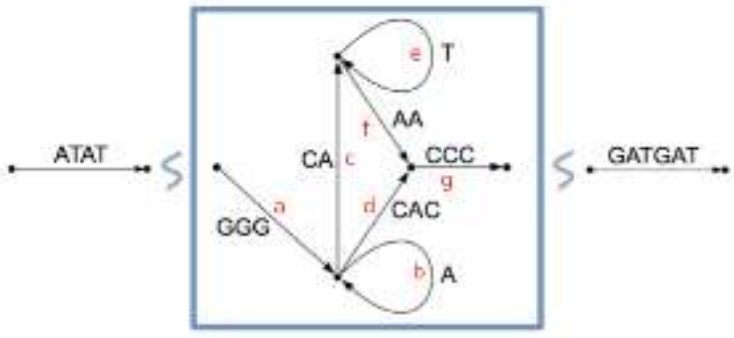
- **SPAdes** outputs contigs and genome assembly graph (**FASTG**/**GFA**)
- **SPAdes** do not have the ability to accept such graphs as input

Goal:

- Implement support for third-party assembly graphs (C++)

Assembly formats

- FASTG is a format for faithfully representing genome assemblies in the face of allelic polymorphism and assembly uncertainty.



- The Graphical Fragment Assembly (GFA) is a tab-delimited text format for describing a set of sequences and their overlap.
  - Header — identifies the type of the line;
  - Segment — a continuous sequence or subsequence;
  - Link — an overlap between two segment;
  - Containment — an overlap between two segments where one is contained in the other;
  - Path — an ordered list of oriented segments, where each consecutive pair of oriented segments are supported by a link record.

Stages in SPAdes

- read_conversion;
- **construction**;
- **simplification**;
- **load_graph**;
- hybrid_aligning;
- late_pair_info_count;
- distance_estimation;
- repeat_resolving.

Done

- Studied next assembly formats: FASTG and GFA
- Launched **SPAdes**
- Understood **SPAdes** structure
- Launched **SPAdes** without spades.py
- Launched **SPAdes** from the specified stage
- Constructed the new stage: load_graph
- Implement support for third-party assembly graphs

The implementation of this functionality will significantly expand the scope of using **SPAdes**.

Another sequence graph

- **SPAdes** accepts de Bruijn graph as input

Question:

- What if another type of sequence graph is provided?

Algorithm

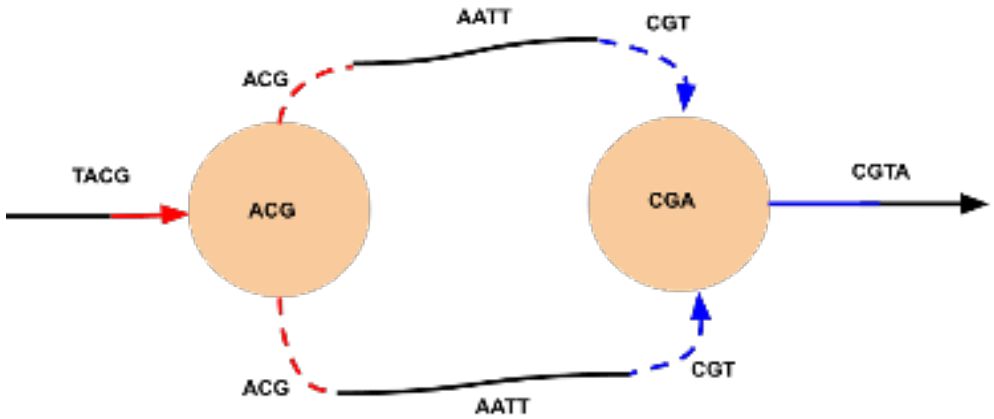
Input: Graph with overlaps = 0, k-mer size k

Output: De Bruijn graph

Algorithm:

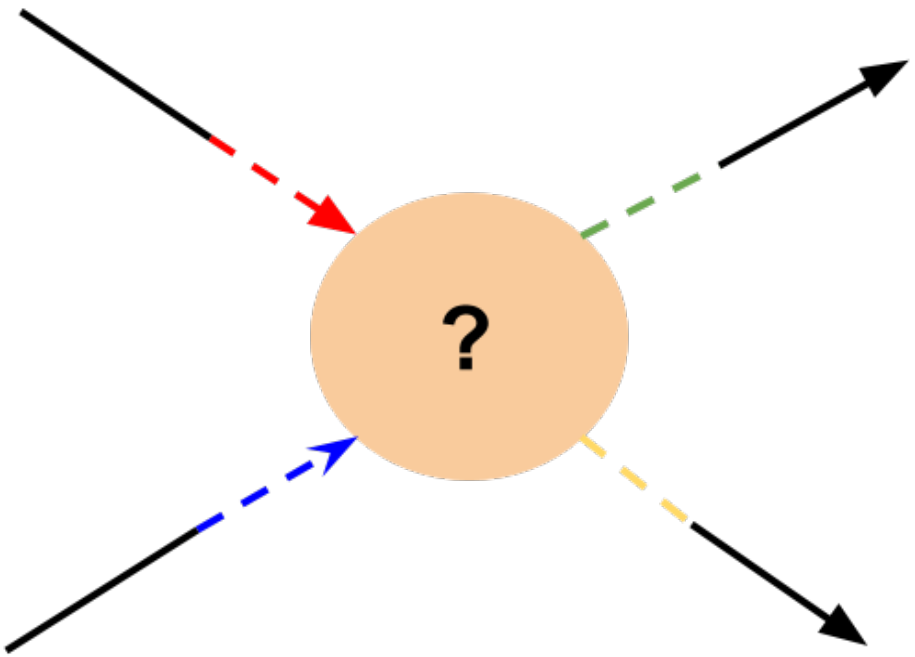
1. Iterate through vertices
2. Continue outgoing edges and complementary edges
3. Repeat until all vertices are processed

Example:



TODO

- There are equal edges in input graph
- There is an edge shorter than k
- Does it exist?



Git repository:

https://github.com/NataZen/SPAdes

Thank you for attention!

Any questions?