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► To cite this version:

Siegfried Dubois, Matthias Zytnicki, Thomas Faraut, Claire Lemaitre. Pangenome graph manipulation for local visualisation with pancat. MIGGS1 2024 - 1st symposium on Methods for Interfacing with Graphs of Genomic Sequences, Sep 2024, Lille, France. pp.1-1. hal-04724519

HAL Id: hal-04724519

<https://hal.science/hal-04724519v1>

Submitted on 7 Oct 2024

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Abstract

Pangenome graph manipulation for local visualisation with pancat

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A pangenome graph is a data structure designed to represent variations among a collection of genomes [1], often from the same species, encapsulating the information of an associated multiple sequence alignment for those genomes. This data structure features multiple levels of information. The *topology* describes how the nodes of the graph are linked to each other, while the *content* pertains to the sequences embedded in the graph, labeling the nodes and inscribing specific paths in the graph.

Pangenome graphs are enormous, with potentially billions of nodes and intricate connectivity patterns [2]. Visualizing these data structures is a significant challenge, and needs to be addressed to facilitate pangenome graph analysis. Multiple visualization tools are currently available, each adopting different approaches: for example, some take *paths* into account [3], others focus on global topology [4], and some are based upon the representation of the embedded sequences [5]. However, in many applications displaying the whole graph structure is not required and can be confusing.

In this work, we propose several approaches to visualize local regions of a graph, along with a visualization tool. We introduce algorithms to aid in the local representation of pangenomes, compatible with *state-of-the-art* GFA visualizers. Our methods include subgraph extraction from positions in a genome, compression of small polymorphisms without loss inside a graph, and abstraction of parts of a graph to reduce the number of elements to render. Additionally, we propose a method allowing the simultaneous visualization of two pangenome graphs built from the same genomes. We tested these methods on real data, highlighting hotspots of differences between graphs made with different tools.

Availability: implementations are part of a Python tool, pancat, available as a open-source project. <https://github.com/Tharos-ux/pancat>

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