Code Feature Analysis, Tracking, and Future Usage

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LLVM Developers' Meeting 2020

Why?

Developers generally use predefined standard optimization pipelines.

They have to manually select which optimization level to use for their code.

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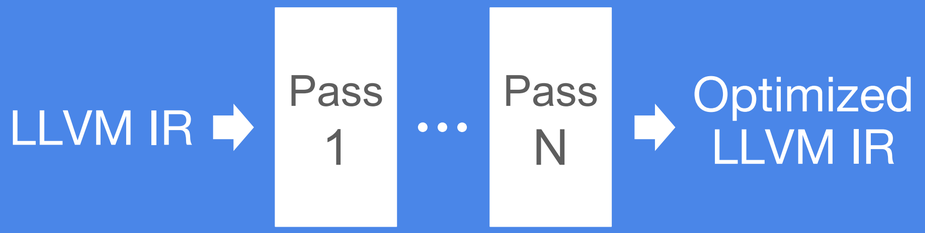
Optimization Pipelines

`-O0` `-O1` `-O2` `-Os` `-Oz` `-O3` `-O4`



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Optimizations are not tailored for a particular kind of application.

They are designed to perform *reasonably well* for any input.

Optimization Pipelines

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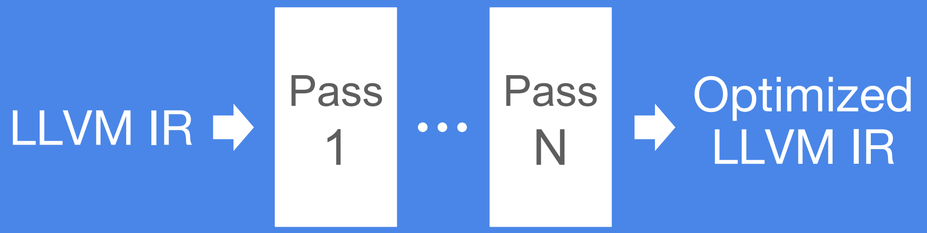
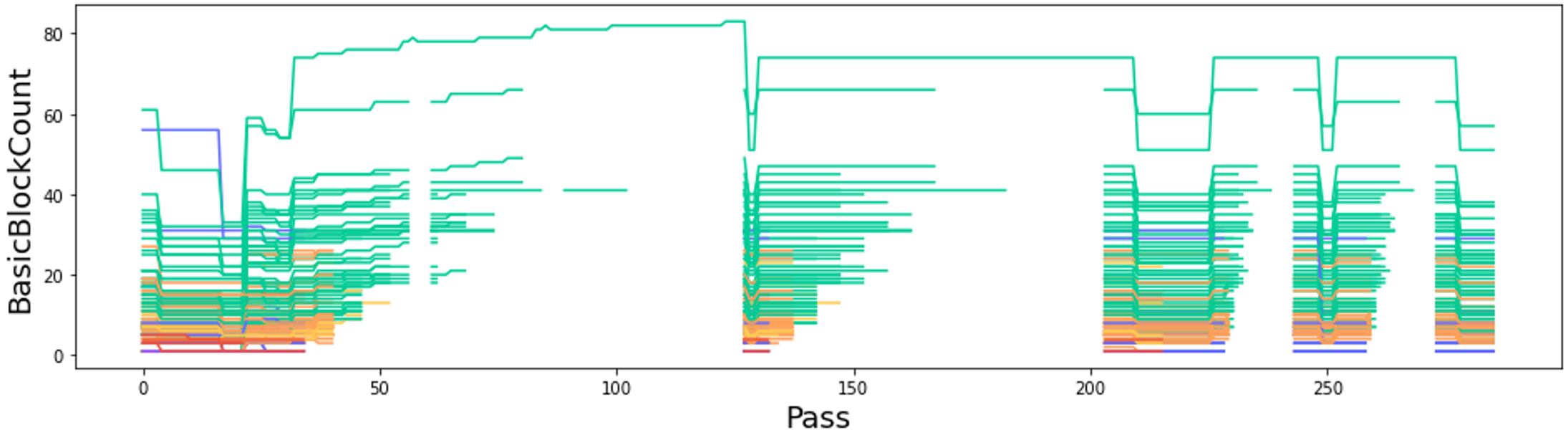
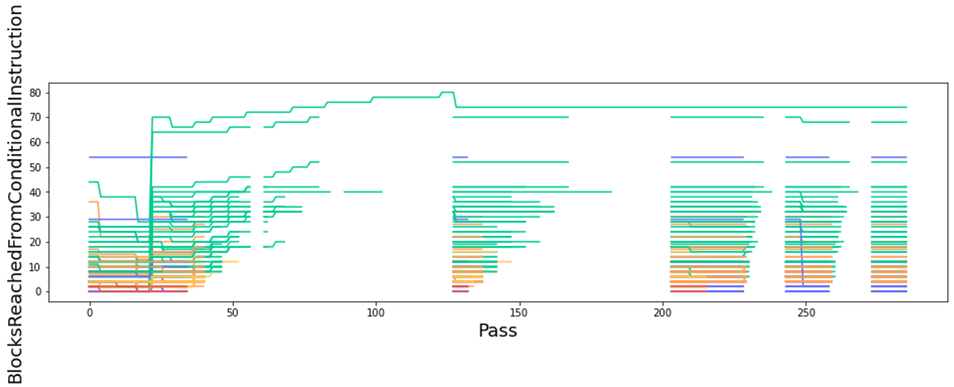


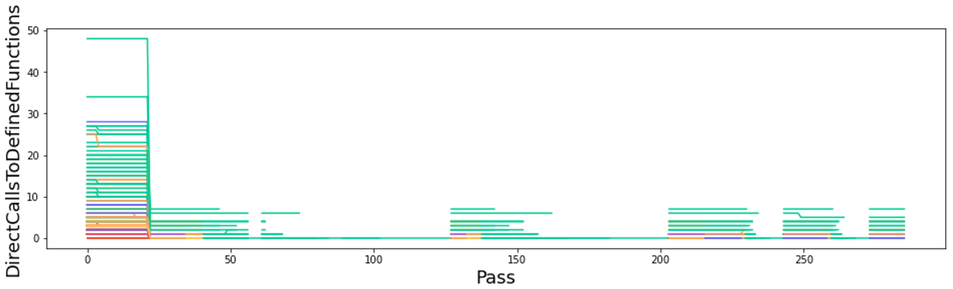
Code Features

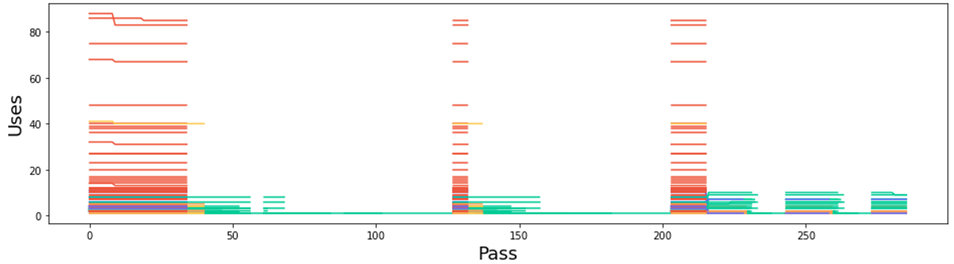
1. total number of basic blocks in the function
2. total number of basic blocks reached from conditional instructions in the function
3. total number of uses of the function
4. total number of direct calls to other defined functions from the function
5. total number of load instructions in the function
6. total number of store instructions in the function
7. maximum loop depth of the function
8. total number of top-level loops in the function

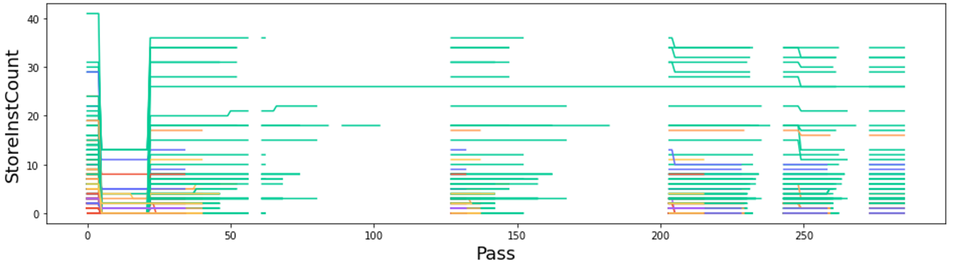
Analysis and Tracking

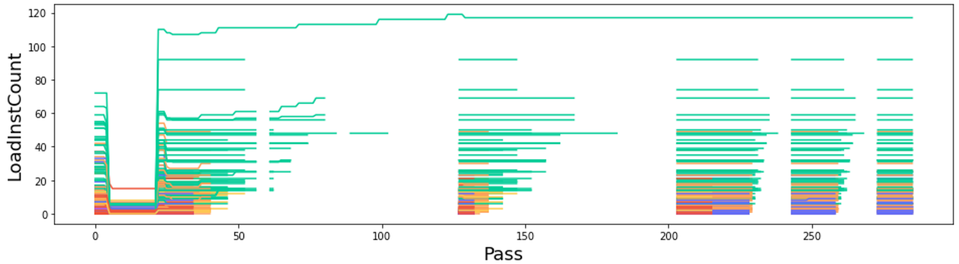


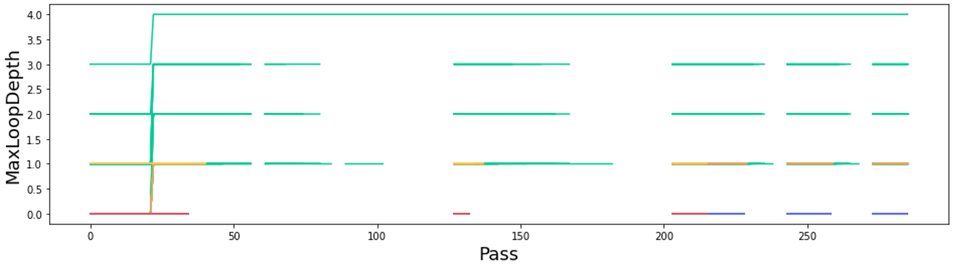

BlocksReachedFromConditionalInstruction
Pass

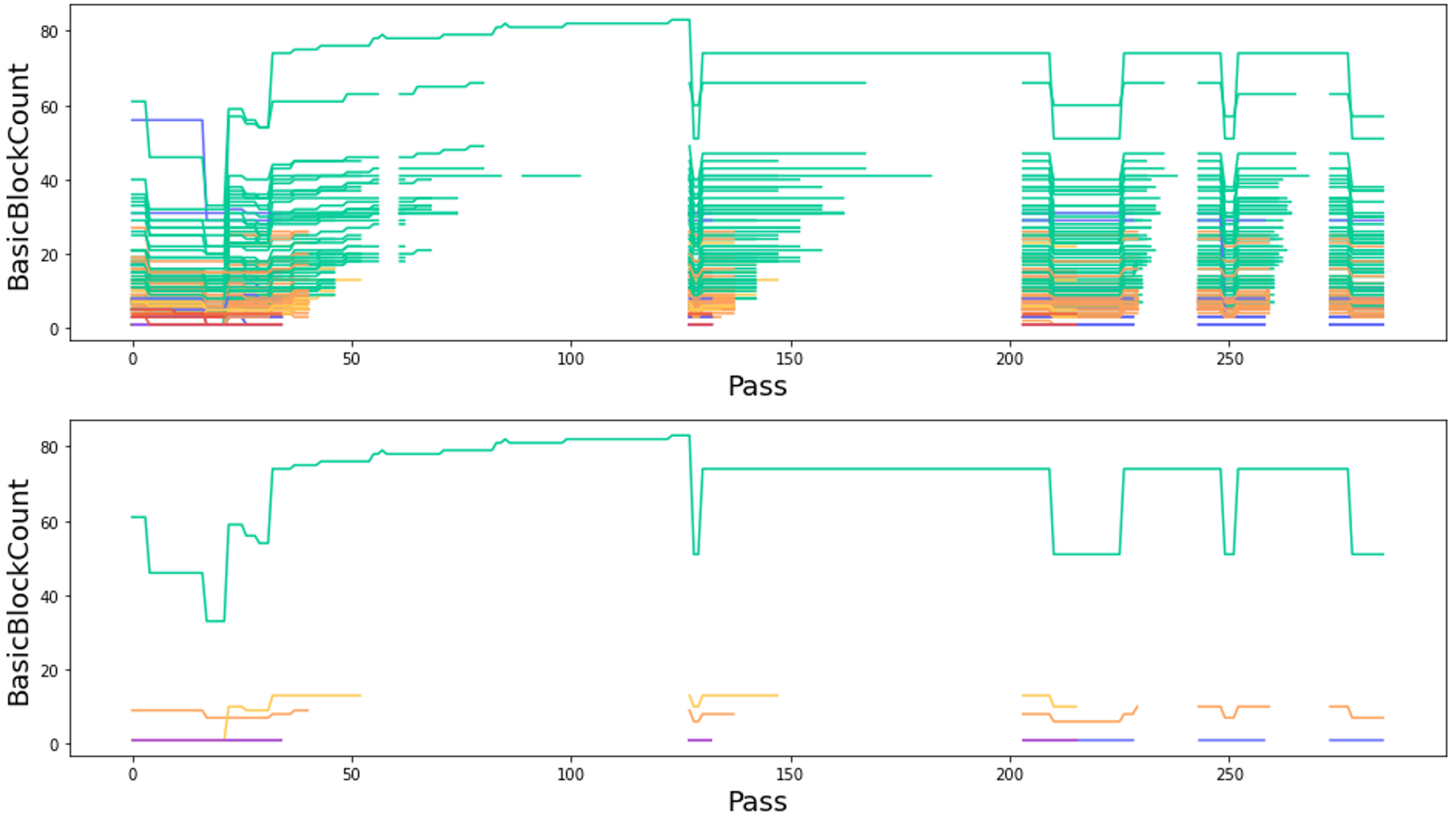

DirectCallsToDefinedFunctions
Pass


Uses
Pass


StoreInstCount
Pass


LoadInstCount
Pass


MaxLoopDepth
Pass


BasicBlockCount
0
20
40
60
80
0
50
100
150
200
250
Pass
BasicBlockCount
0
20
40
60
80
0
50
100
150
200
250
Pass

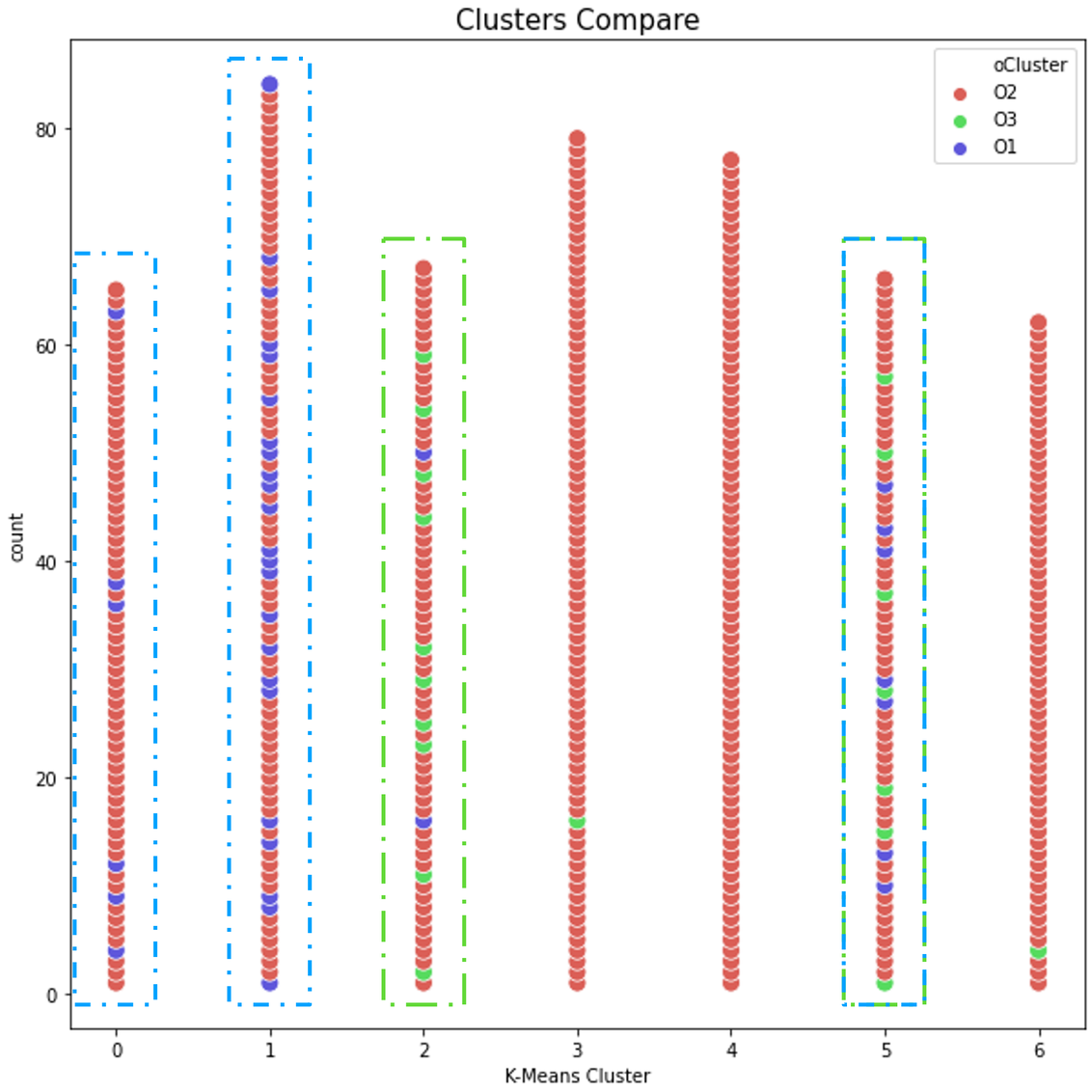
Usage

We compare assembly files after standard optimization levels: O1, O2, and O3.

Clusters seem to work.. for the most part?

In the future:

- More clusters
- More features



Thank you!

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