Semantically Meaningful S-expression Diff

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- Automated source manipulation tools can be written easily
- sdiff—a diff program for S-expressions.

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```
@@ -7,5 +7,5 @@
((? string?)
 (updated-url source-uri))
((source-uri ...)
-(find updated-url source-uri))))))
+(any updated-url source-uri))))))
(_ #f))
```

Lisp projects use diff too

Impedance mismatch between S-expressions and line-oriented diff

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Can you spot the actual change in the following diff?

```
< (/ (+ (- b)
<       (sqrt (- (* expt b 2)
<                (* 4 a c))))
<    (* 2 a))
---
> (let ((b 1))
>   (/ (+ (- b)
>         (sqrt (- (* expt b 2)
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>      (* 2 a)))
```

We need a tree diff for S-expressions

Not a line diff

We need a tree diff.

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- For unordered trees, the problem is $\mathcal{NP}$-hard.
- We only deal with ordered trees.
- sdiff implements the $\mathrm{MH\text{-}DIFF}$ (Meaningful Hierarchical Diff) algorithm.

Meaningful change detection in structured data. Sudarshan Chawathe, Hector Garcia-Molina, 1997. ACM SIGMOD Record, 26(2), pp.26-37.

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MH-DIFF operates in two phases.

1. Match old and new trees.
2. Extract an edit script from the matching.

MH-DIFF

Matching old and new trees

Match changed/unchanged parts of old and new trees.

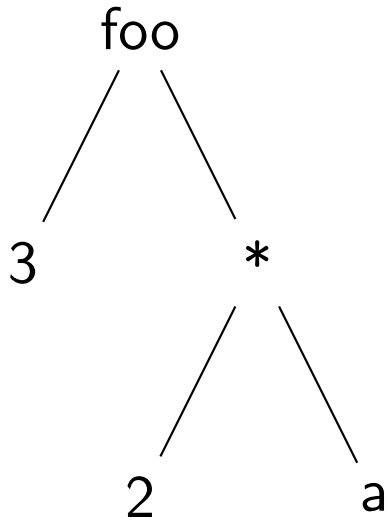


Figure: Old tree

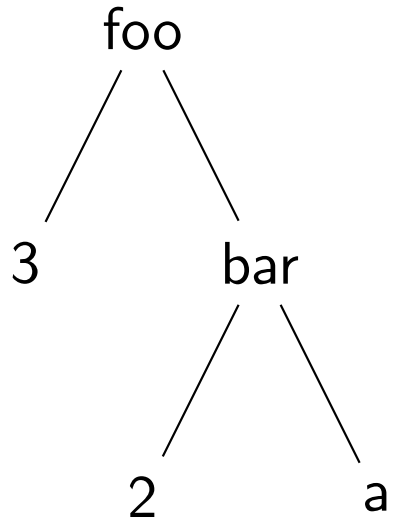
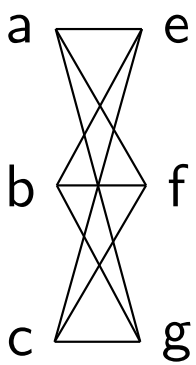


Figure: New tree

MH-DIFF

Minimum cost edge cover



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MH-DIFF

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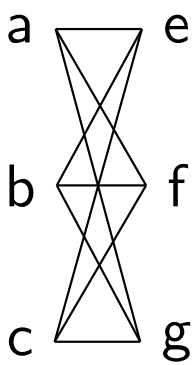

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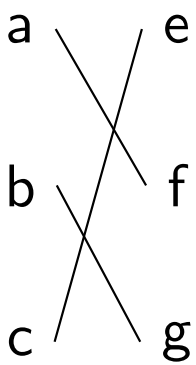

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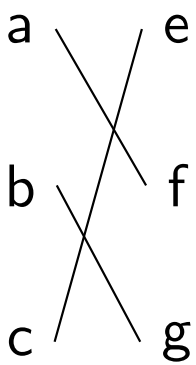

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- The minimum cost edge cover problem can be solved using the Hungarian algorithm

Demos!

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- cleaner and more concise diff output
- a more optimized implementation that scales better
- integrate and replace tooling such as git diff
- use as diff for other S-expression data (such as LibrePCB)

Thank You!

Code is available under GPLv3 at

`https://systemreboot.net/files/sdiff-fosdem2021.tar.gz`

- Would you use sdiff?
- How can sdiff be more useful?
- Feedback and criticism welcome!

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