

Activity Analysis: Summary

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Reminder of AA

```
fn(x):  
    a = x*x  
    b = 1  
    return a
```

Varied Analysis

```
f1_grad(x, _d_x):  
    _d_a = 0.;  
    a = x * x;  
  
→ _d_b = 0.;  
   b = 1;  
  
    _d_a += 1;  
  
    _d_x += _d_a * x;  
    _d_x += x * _d_a;
```

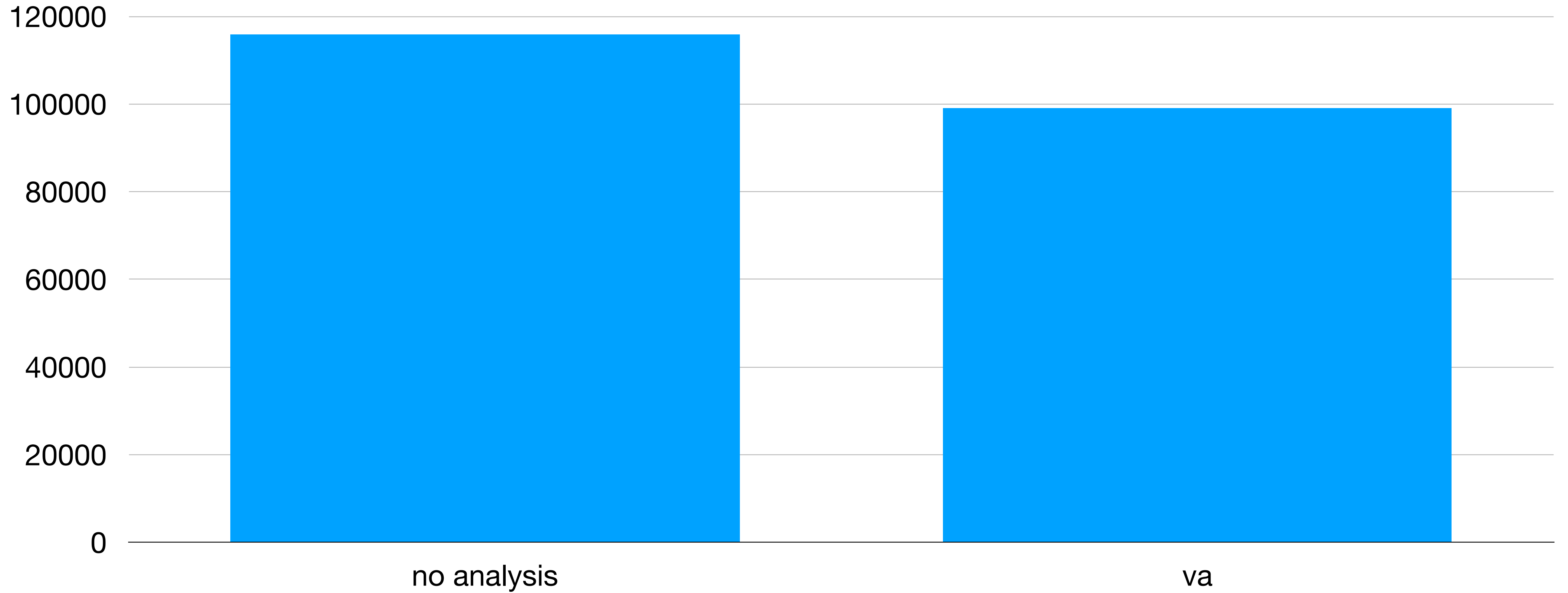
Useful Analysis

```
f1_darg0(x):  
    _d_x = 1  
    _d_a = _d_x * x + x * _d_x  
    a = x * x  
  
→ _d_b = 0  
   b = 1  
  
    return _d_a
```

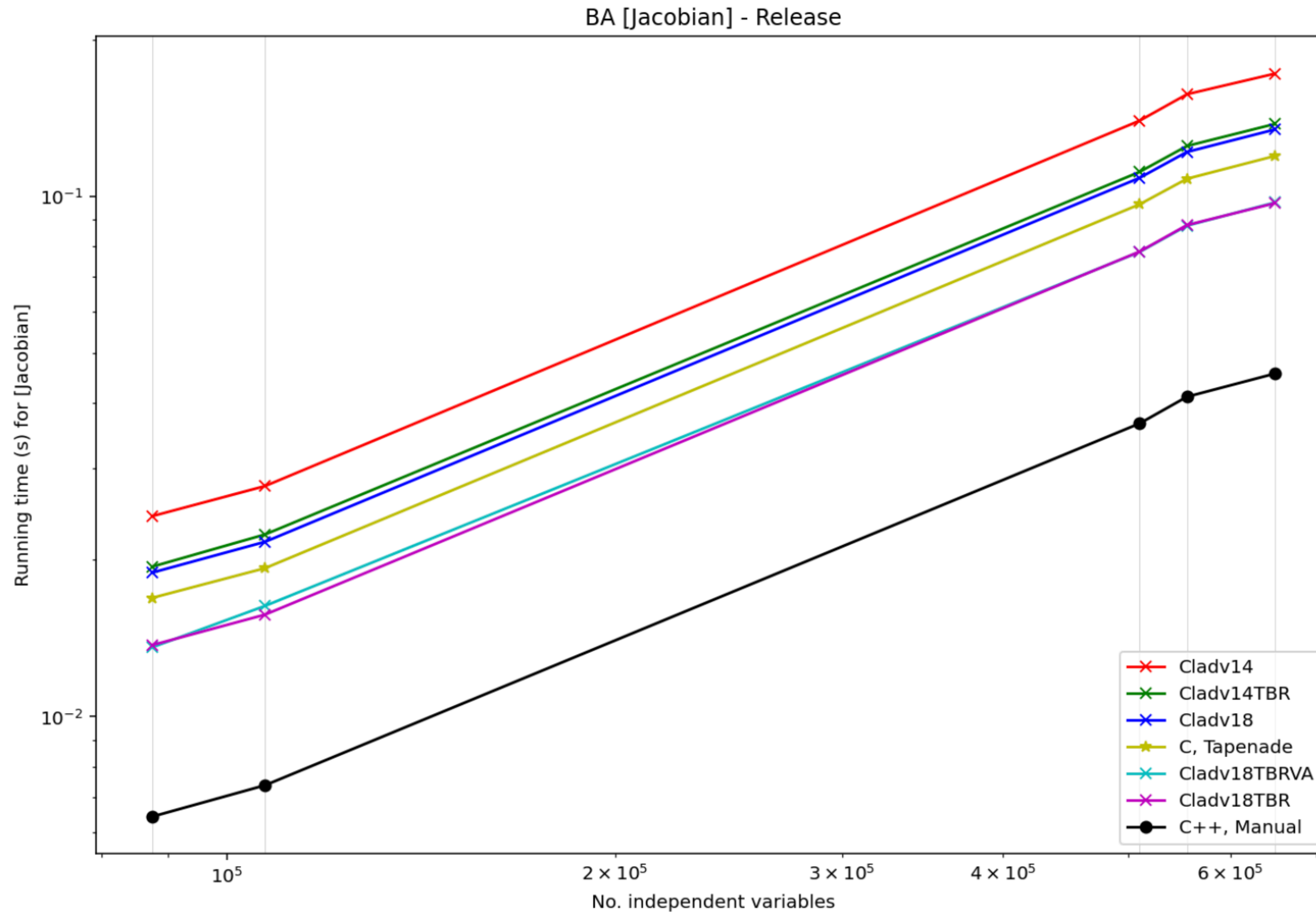
CMS example

```
const double t1007 = RooFit::Detail::MathFuncs::interpolate1d(109.75, 150.25, 125.5, 81, xLArr + 75529);
const double t1009 = RooFit::Detail::MathFuncs::interpolate1d(105., 155., 125.5, 5, xLArr + 75610);
const double t1010 = RooFit::Detail::MathFuncs::interpolate1d(105., 155., 125.5, 5, xLArr + 75615);
double t1008[] = {1., t1009, t1010};
double t1006[] = {t979, t1007, TFormula____id2636230066274290005(t1008)};
double t1001[] = {t1005, TFormula____id4148177821726483873(t1006)};
const double t1013 = RooFit::Detail::MathFuncs::product(t1001, 2);
double t1015[] = {params[655]};
double t1016[] = {params[63], params[65], params[66], params[67], params[70], params[71], params[73], params[74],
                 params[76], params[77], params[78], params[79], params[80], params[81], params[82], params[83],
                 params[84], params[86], params[87], params[88], params[90], params[91], params[644], params[654]};
double t1017[] = {params[5], params[6], params[7], params[35], params[98], params[648], params[650], params[72]};
const double t1018 = RooFit::Detail::MathFuncs::processNormalization(5345., 8, 24, 1, t1017, xLArr + 75668, t1016,
                                                                    xLArr + 75644, xLArr + 75620, t1015);
```

CMS example



ADBench Results



Don't mark non-varied constant params #1148

 Open `ovdiuv` wants to merge 5 commits into `vgvassilev:master` from `ovdiuv:varfix` 

[WIP] Add Useful Analysis to the forward mode #1120

 Open `ovdiuv` wants to merge 1 commit into `vgvassilev:master` from `ovdiuv:useful` 

What's next?

- Redesign VA not to assume a variable is varied everywhere
- Improve loops handling to visit the body only once
- Make the analysis default