Structural Variant Detection Notes

# March 10, 2022

# Reproducing Andrew’s Code: Haploid data

MethodCompare.m is the script Andrew used to run his code (uses 2 SPIRAL scripts, 1 for each noise type)

compare\_methods\_haploid.m is the script I am working with (uses 1 SPIRAL script with 2 noisetype cases)

Data:

* 1 parent, 1 child (haploid)
* novel,

|  |  |
| --- | --- |
| MethodCompare.m |  |
| Andrew’s data:  Chart, line chart  Description automatically generated  iter\_p = 10, iter\_nb = 10 | Reproduced data:  Chart  Description automatically generated  iter\_p = 10, iter\_nb = 10 |
| compare\_methods\_haploid.m |  |
|  |  |
| Andrew’s data:  Chart, line chart  Description automatically generated  iter\_p = 62, iter\_nb = 164 | Reproduced data:  Chart, line chart  Description automatically generated  iter\_p = 5, iter\_nb = 108 |

Jocelyn’s code

Using Andrews data

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= Beginning NEBULA Reconstruction @ 16: 9 03/09/2022 =

= Noisetype: poisson Penalty: Canonical =

= Tau Vals: 1.00e+00 , 1.00e+01 Maxiter: 5 =

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Iter: 1, ||dx||%: 1.2112e+02, Alph: 2.5353e+30, Alph Acc: 1.2677e+30, Time: 1.477095e-02, Obj: 3.5334e+01, dObj%: 1.9610e+01, Err: 8.4764e-01

Iter: 2, ||dx||%: 6.0802e-01, Alph: 4.4038e+03, Alph Acc: 2.2019e+03, Time: 1.730832e-02, Obj: 3.5311e+01, dObj%: 6.4970e-02, Err: 8.4820e-01

Iter: 3, ||dx||%: 2.2140e+00, Alph: 1.2079e+03, Alph Acc: 6.0393e+02, Time: 1.864249e-02, Obj: 3.5248e+01, dObj%: 1.7872e-01, Err: 8.5036e-01

Iter: 4, ||dx||%: 1.9701e+00, Alph: 1.3382e+03, Alph Acc: 6.6912e+02, Time: 1.966430e-02, Obj: 3.5229e+01, dObj%: 5.4156e-02, Err: 8.5242e-01

Iter: 5, ||dx||%: 1.8103e+00, Alph: 1.4357e+03, Alph Acc: 7.1787e+02, Time: 2.340214e-02, Obj: 3.5245e+01, dObj%: 4.6441e-02, Err: 8.5441e-01

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= Completed NEBULA Reconstruction @ 16: 9 03/09/2022 =

= Noisetype: poisson Penalty: Canonical =

= Tau: 1.00e+00 , 1.00e+01 Iter: 5 =

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= Beginning NEBULA Reconstruction @ 16: 9 03/09/2022 =

= Noisetype: negative binomial Penalty: Canonical =

= Tau Vals: 1.00e+00 , 1.00e+01 Maxiter: 5 =

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Iter: 1, ||dx||%: 1.2112e+02, Alph: 2.5353e+30, Alph Acc: 1.2677e+30, Time: 5.333866e-03, Obj: 1.1130e+02, dObj%: 7.4907e+00, Err: 8.4764e-01

Iter: 2, ||dx||%: 5.2240e+01, Alph: 3.4405e+01, Alph Acc: 1.7203e+01, Time: 1.405224e-02, Obj: 1.0926e+02, dObj%: 1.8326e+00, Err: 8.9814e-01

Iter: 3, ||dx||%: 9.9571e+00, Alph: 1.1732e+02, Alph Acc: 5.8660e+01, Time: 1.456793e-02, Obj: 1.1259e+02, dObj%: 3.0461e+00, Err: 8.9819e-01

Iter: 4, ||dx||%: 6.3058e+00, Alph: 6.6654e+01, Alph Acc: 3.3327e+01, Time: 1.483367e-02, Obj: 1.1403e+02, dObj%: 1.2824e+00, Err: 8.9685e-01

Iter: 5, ||dx||%: 5.8157e+00, Alph: 4.6059e+01, Alph Acc: 2.3030e+01, Time: 1.609614e-02, Obj: 1.1572e+02, dObj%: 1.4759e+00, Err: 8.9718e-01

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= Completed NEBULA Reconstruction @ 16: 9 03/09/2022 =

= Noisetype: negative binomial Penalty: Canonical =

= Tau: 1.00e+00 , 1.00e+01 Iter: 5 =

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Jocelyn’s code – putting back Andrew’s code

Using Andrews data

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= Beginning NEBULA Reconstruction @ 16:19 03/09/2022 =

= Noisetype: poisson Penalty: Canonical =

= Tau Vals: 1.00e+00 , 1.00e+01 Maxiter: 5 =

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Iter: 1, ||dx||%: 1.2112e+02, Alph: 2.5353e+30, Alph Acc: 1.2677e+30, Time: 1.838916e-02, Obj: 1.3139e+01, dObj%: 5.5525e+01, Err: 8.4764e-01

Iter: 2, ||dx||%: 1.9864e+01, Alph: 1.3762e+02, Alph Acc: 6.8810e+01, Time: 1.997442e-02, Obj: 1.4583e+01, dObj%: 1.0992e+01, Err: 8.5616e-01

Iter: 3, ||dx||%: 1.2703e+01, Alph: 1.4442e+02, Alph Acc: 7.2210e+01, Time: 2.081163e-02, Obj: 1.6862e+01, dObj%: 1.5633e+01, Err: 8.6559e-01

Iter: 4, ||dx||%: 1.8416e+01, Alph: 9.0297e+01, Alph Acc: 4.5148e+01, Time: 2.148836e-02, Obj: 2.8648e+01, dObj%: 6.9894e+01, Err: 8.7612e-01

Iter: 5, ||dx||%: 2.1402e-01, Alph: 5.7139e+05, Alph Acc: 2.8570e+05, Time: 2.782810e-02, Obj: 2.6070e+01, dObj%: 8.9988e+00, Err: 8.7613e-01

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= Completed NEBULA Reconstruction @ 16:19 03/09/2022 =

= Noisetype: poisson Penalty: Canonical =

= Tau: 1.00e+00 , 1.00e+01 Iter: 5 =

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= Beginning NEBULA Reconstruction @ 16:19 03/09/2022 =

= Noisetype: negative binomial Penalty: Canonical =

= Tau Vals: 1.00e+00 , 1.00e+01 Maxiter: 5 =

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Iter: 1, ||dx||%: 1.2112e+02, Alph: 2.5353e+30, Alph Acc: 1.2677e+30, Time: 6.959384e-03, Obj: 8.9104e+01, dObj%: 2.5939e+01, Err: 8.4764e-01

Iter: 2, ||dx||%: 2.3285e+01, Alph: 1.3762e+02, Alph Acc: 6.8810e+01, Time: 1.471888e-02, Obj: 8.8605e+01, dObj%: 5.6034e-01, Err: 8.5659e-01

Iter: 3, ||dx||%: 1.8291e+01, Alph: 1.6070e+02, Alph Acc: 8.0348e+01, Time: 1.751277e-02, Obj: 8.8491e+01, dObj%: 1.2854e-01, Err: 8.6970e-01

Iter: 4, ||dx||%: 2.6698e+01, Alph: 1.0064e+02, Alph Acc: 5.0322e+01, Time: 1.794011e-02, Obj: 9.1088e+01, dObj%: 2.9347e+00, Err: 8.8431e-01

Iter: 5, ||dx||%: 6.1830e+00, Alph: 5.3468e+02, Alph Acc: 2.6734e+02, Time: 1.882329e-02, Obj: 9.0474e+01, dObj%: 6.7414e-01, Err: 8.8835e-01

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= Completed NEBULA Reconstruction @ 16:19 03/09/2022 =

= Noisetype: negative binomial Penalty: Canonical =

= Tau: 1.00e+00 , 1.00e+01 Iter: 5 =

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Andrew’s code

Using Andrews data

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= Beginning SPIRAL Reconstruction @ 16:18 03/09/2022 =

= Noisetype: Poisson Penalty: Canonical =

= Tau Vals: 1.00000e+00, 1.00000e+01 Maxiter: 5 =

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Iter: 1, ||dx||%: 1.0408e+02, Alph: 1.2800e+02, Alph Acc: 6.4000e+01, Time: 3.751398e-03, Obj: 2.4732e+00, dObj%: 9.1628e+01, Err: 7.2672e-01

Iter: 2, ||dx||%: 2.8009e+01, Alph: 1.6103e+02, Alph Acc: 8.0514e+01, Time: 7.277527e-03, Obj: 9.5496e+00, dObj%: 2.8613e+02, Err: 7.1929e-01

Iter: 3, ||dx||%: 3.0679e+01, Alph: 5.7150e+01, Alph Acc: 2.8575e+01, Time: 1.034783e-02, Obj: -7.4693e+00, dObj%: 1.7822e+02, Err: 7.1883e-01

Iter: 4, ||dx||%: 1.6669e+00, Alph: 7.8927e+02, Alph Acc: 3.9463e+02, Time: 1.072595e-02, Obj: -7.8884e+00, dObj%: 5.6106e+00, Err: 7.1781e-01

Iter: 5, ||dx||%: 1.4281e+00, Alph: 4.1071e+02, Alph Acc: 2.0535e+02, Time: 1.093751e-02, Obj: -8.1585e+00, dObj%: 3.4240e+00, Err: 7.1736e-01

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= Completed SPIRAL Reconstruction @ 16:18 03/09/2022 =

= Noisetype: Poisson Penalty: Canonical =

= Tau: 1.00000e+00 Iter: 5 =

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= Beginning SPIRAL Reconstruction @ 16:18 03/09/2022 =

= Noisetype: Negative Binomial Penalty: Canonical =

= Tau Vals: 1.00000e+00, 1.00000e+01 Maxiter: 5 =

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Iter: 1, ||dx||%: 1.0499e+02, Alph: 1.2800e+02, Alph Acc: 6.4000e+01, Time: 9.769748e-03, Obj: 8.3462e+01, dObj%: 3.0629e+01, Err: 7.2838e-01

Iter: 2, ||dx||%: 2.8045e+01, Alph: 1.2175e+02, Alph Acc: 6.0877e+01, Time: 1.406550e-02, Obj: 8.4617e+01, dObj%: 1.3836e+00, Err: 7.2311e-01

Iter: 3, ||dx||%: 4.2879e+01, Alph: 4.0545e+01, Alph Acc: 2.0273e+01, Time: 1.595697e-02, Obj: 6.5531e+01, dObj%: 2.2556e+01, Err: 7.5853e-01

Iter: 4, ||dx||%: 2.1253e+00, Alph: 4.1691e+02, Alph Acc: 2.0846e+02, Time: 1.669565e-02, Obj: 6.5173e+01, dObj%: 5.4601e-01, Err: 7.5812e-01

Iter: 5, ||dx||%: 3.9432e+00, Alph: 1.5634e+02, Alph Acc: 7.8171e+01, Time: 2.055550e-02, Obj: 6.4569e+01, dObj%: 9.2760e-01, Err: 7.5918e-01

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= Completed SPIRAL Reconstruction @ 16:18 03/09/2022 =

= Noisetype: Negative Binomial Penalty: Canonical

= Tau: 1.00000e+00 Iter: 5 =

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# April 5, 2022

# Results of reproducing Andrew’s code:

Chart, line chart

Description automatically generated Chart, line chart

Description automatically generated

Both algorithms took 42 iterations for Poisson and 81 iterations for Negative Binomial

Jocelyn Poisson:

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= Beginning NEBULA Reconstruction @ 10:18 04/05/2022 =

= Noisetype: poisson Penalty: Canonical =

= Reg Vals: 1.000 , 10.000 Maxiter: 1000 =

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Iter: 10, ||dx||%: 1.9392e+00, Alph: 9.9178e+02, Alph Acc: 4.9589e+02, Time: 2.966106e-02, Obj: -1.0810e+01, dObj%: 7.5098e+00, Err: 7.4306e-01

Iter: 20, ||dx||%: 1.4605e+00, Alph: 8.2498e+03, Alph Acc: 4.1249e+03, Time: 3.280388e-02, Obj: -1.1914e+01, dObj%: 4.4573e+01, Err: 7.9861e-01

Iter: 30, ||dx||%: 1.2961e-02, Alph: 9.9455e+01, Alph Acc: 4.9728e+01, Time: 3.435693e-02, Obj: -1.3519e+01, dObj%: 5.2871e-05, Err: 7.9111e-01

Iter: 40, ||dx||%: 3.0103e-05, Alph: 2.7902e+01, Alph Acc: 1.3951e+01, Time: 3.543938e-02, Obj: -1.3519e+01, dObj%: 1.0551e-11, Err: 7.9112e-01

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= Completed NEBULA Reconstruction @ 10:18 04/05/2022 =

= Noisetype: poisson Penalty: Canonical =

= Reg Vals: 1.00 , 10.00 Iter: 42 =

Andrew Poisson:

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= Beginning SPIRAL Reconstruction @ 10:21 04/05/2022 =

= Noisetype: Poisson Penalty: Canonical =

= Tau Vals: 1.00000e+00, 1.00000e+01 Maxiter: 1000 =

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Iter: 10, ||dx||%: 1.9392e+00, Alph: 9.9178e+02, Alph Acc: 4.9589e+02, Time: 1.418222e-02, Obj: -1.0810e+01, dObj%: 7.5098e+00, Err: 7.4306e-01

Iter: 20, ||dx||%: 1.4605e+00, Alph: 8.2498e+03, Alph Acc: 4.1249e+03, Time: 1.572119e-02, Obj: -1.1914e+01, dObj%: 4.4573e+01, Err: 7.9861e-01

Iter: 30, ||dx||%: 1.2961e-02, Alph: 9.9455e+01, Alph Acc: 4.9728e+01, Time: 1.693811e-02, Obj: -1.3519e+01, dObj%: 5.2871e-05, Err: 7.9111e-01

Iter: 40, ||dx||%: 3.0103e-05, Alph: 2.7902e+01, Alph Acc: 1.3951e+01, Time: 1.772477e-02, Obj: -1.3519e+01, dObj%: 1.0551e-11, Err: 7.9112e-01

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= Completed SPIRAL Reconstruction @ 10:21 04/05/2022 =

= Noisetype: Poisson Penalty: Canonical =

= Tau: 1.00000e+00 Iter: 42 =

Jocelyn Negative Binomial:

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= Beginning NEBULA Reconstruction @ 10:18 04/05/2022 =

= Noisetype: negative binomial Penalty: Canonical =

= Reg Vals: 1.000 , 10.000 Maxiter: 1000 =

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Iter: 10, ||dx||%: 9.4017e-01, Alph: 6.4944e+02, Alph Acc: 3.2472e+02, Time: 7.517335e-03, Obj: 6.2833e+01, dObj%: 2.0714e-01, Err: 7.7779e-01

Iter: 20, ||dx||%: 2.4021e-01, Alph: 9.1516e+01, Alph Acc: 4.5758e+01, Time: 1.108256e-02, Obj: 6.2593e+01, dObj%: 1.4354e-03, Err: 7.8034e-01

Iter: 30, ||dx||%: 3.5520e-02, Alph: 2.1658e+01, Alph Acc: 1.0829e+01, Time: 1.236755e-02, Obj: 6.2593e+01, dObj%: 4.9595e-06, Err: 7.8100e-01

Iter: 40, ||dx||%: 3.0774e-03, Alph: 3.4652e+01, Alph Acc: 1.7326e+01, Time: 1.313173e-02, Obj: 6.2593e+01, dObj%: 1.4475e-07, Err: 7.8102e-01

Iter: 50, ||dx||%: 3.4784e-04, Alph: 1.0613e+02, Alph Acc: 5.3067e+01, Time: 1.376389e-02, Obj: 6.2593e+01, dObj%: 3.8837e-09, Err: 7.8103e-01

Iter: 60, ||dx||%: 1.2549e-04, Alph: 2.0547e+01, Alph Acc: 1.0274e+01, Time: 1.450892e-02, Obj: 6.2593e+01, dObj%: 3.5804e-11, Err: 7.8103e-01

Iter: 70, ||dx||%: 1.0694e-05, Alph: 3.8332e+01, Alph Acc: 1.9166e+01, Time: 1.522926e-02, Obj: 6.2593e+01, dObj%: 1.9525e-12, Err: 7.8103e-01

Iter: 80, ||dx||%: 1.6121e-06, Alph: 1.0599e+02, Alph Acc: 5.2993e+01, Time: 1.598451e-02, Obj: 6.2593e+01, dObj%: 9.0815e-14, Err: 7.8103e-01

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= Completed NEBULA Reconstruction @ 10:18 04/05/2022 =

= Noisetype: negative binomial Penalty: Canonical =

= Reg Vals: 1.00 , 10.00 Iter: 81 =

Andrew Negative Binomial:

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= Beginning SPIRAL Reconstruction @ 10:12 04/05/2022 =

= Noisetype: Negative Binomial Penalty: Canonical =

= Tau Vals: 1.00000e+00, 1.00000e+01 Maxiter: 1000 =

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Iter: 10, ||dx||%: 9.4017e-01, Alph: 6.4944e+02, Alph Acc: 3.2472e+02, Time: 2.145323e-02, Obj: 6.2833e+01, dObj%: 2.0714e-01, Err: 7.7779e-01

Iter: 20, ||dx||%: 2.4021e-01, Alph: 9.1516e+01, Alph Acc: 4.5758e+01, Time: 2.292737e-02, Obj: 6.2593e+01, dObj%: 1.4354e-03, Err: 7.8034e-01

Iter: 30, ||dx||%: 3.5520e-02, Alph: 2.1658e+01, Alph Acc: 1.0829e+01, Time: 2.379029e-02, Obj: 6.2593e+01, dObj%: 4.9595e-06, Err: 7.8100e-01

Iter: 40, ||dx||%: 3.0774e-03, Alph: 3.4652e+01, Alph Acc: 1.7326e+01, Time: 2.505771e-02, Obj: 6.2593e+01, dObj%: 1.4475e-07, Err: 7.8102e-01

Iter: 50, ||dx||%: 3.4784e-04, Alph: 1.0613e+02, Alph Acc: 5.3067e+01, Time: 2.659698e-02, Obj: 6.2593e+01, dObj%: 3.8837e-09, Err: 7.8103e-01

Iter: 60, ||dx||%: 1.2549e-04, Alph: 2.0547e+01, Alph Acc: 1.0274e+01, Time: 2.998027e-02, Obj: 6.2593e+01, dObj%: 3.5804e-11, Err: 7.8103e-01

Iter: 70, ||dx||%: 1.0694e-05, Alph: 3.8332e+01, Alph Acc: 1.9166e+01, Time: 3.107390e-02, Obj: 6.2593e+01, dObj%: 1.9525e-12, Err: 7.8103e-01

Iter: 80, ||dx||%: 1.6121e-06, Alph: 1.0599e+02, Alph Acc: 5.2993e+01, Time: 3.184161e-02, Obj: 6.2593e+01, dObj%: 9.0815e-14, Err: 7.8103e-01

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= Completed SPIRAL Reconstruction @ 10:12 04/05/2022 =

= Noisetype: Negative Binomial Penalty: Canonical =

= Tau: 1.00000e+00 Iter: 81 =

## The issue:

The order of the vectors in the defining script was different.

The order of the stacked vectors in f has an effect on alpha values.

# Diploid Case