

```
In [1]: include("/home/nicole/Jupyter/SSBRJ/src/SSBR.jl")  
using SSBR
```

```
In [2]: function getPos(ped,IDs)  
        posAi = Array{Int64,1}(size(IDs,1))  
        for (i,id) = enumerate(IDs[:,1])  
            posAi[i] = ped.idMap[id].seqID  
        end  
        return posAi  
end
```

Out[2]: getPos (generic function with 1 method)

```
In [3]: ; cd Data/0.5g2k/G/4  
  
/home/nicole/Jupyter/JG3/Data/0.5g2k/G/4
```

```
In [4]: ;ls
```

```
Correlation.G5.G.JC.txt  
Correlation.G5.G.PBLUP.txt  
G0.Genotype.ID  
G0.ID  
G0.noGenotype.ID  
G1.Genotype.ID  
G1.ID  
G1.noGenotype.ID  
G2.Genotype.ID  
G2.ID  
G2.noGenotype.ID  
G3.Genotype.ID  
G3.ID  
G3.noGenotype.ID  
G4.Genotype.ID  
G4.ID  
G4.noGenotype.ID  
G5.Genotype.ID  
G5.ID  
G5.noGenotype.ID  
GenNF.txt  
PedAll.txt  
Phe.txt  
PheAll.txt  
Regression.G5.G.JC.txt  
Regression.G5.G.PBLUP.txt  
all.ID  
genotype.ID  
noGenotype.ID  
sim.bv  
sim.phenotype
```

```
In [5]: ;awk '{print $1}' PedAll.txt | sort -b > all.ID
```

```
In [6]: ;awk '{print $1}' GenNF.txt | sort -b > genotype.ID
```

```
In [7]: ;join -v1 all.ID genotype.ID > noGenotype.ID
```

```
In [8]: ;awk '{print $1,$2}' Phe.txt > sim.phenotype
```

```
In [9]: ;awk '{print $1,$3}' PheAll.txt > sim.bv
```

```
In [10]: ; awk 'NR >=1 && NR <=8000 {print $1}' PedAll.txt | sort -b > G0.ID
```

```
In [11]: ; awk 'NR >=8001 && NR <=16000 {print $1}' PedAll.txt | sort -b > G1.ID
```

```
In [12]: ; awk 'NR >=16001 && NR <=24000 {print $1}' PedAll.txt | sort -b > G2.ID
```

```
In [13]: ; awk 'NR >=24001 && NR <=32000 {print $1}' PedAll.txt | sort -b > G3.ID
```

```
In [14]: ; awk 'NR >=32001 && NR <=40000 {print $1}' PedAll.txt | sort -b > G4.ID
```

```
In [15]: ; awk 'NR >=40001 && NR <=48000 {print $1}' PedAll.txt | sort -b > G5.ID
```

```
In [16]: ;join G0.ID genotype.ID > G0.Genotype.ID
```

```
In [17]: ;join G1.ID genotype.ID > G1.Genotype.ID
```

```
In [18]: ;join G2.ID genotype.ID > G2.Genotype.ID
```

```
In [19]: ;join G3.ID genotype.ID > G3.Genotype.ID
```

```
In [20]: ;join G4.ID genotype.ID > G4.Genotype.ID
```

```
In [21]: ;join G5.ID genotype.ID > G5.Genotype.ID
```

```
In [22]: ;join -v1 G0.ID genotype.ID > G0.noGenotype.ID
```

```
In [23]: ;join -v1 G1.ID genotype.ID > G1.noGenotype.ID
```

```
In [24]: ;join -v1 G2.ID genotype.ID > G2.noGenotype.ID
```

```
In [25]: ;join -v1 G3.ID genotype.ID > G3.noGenotype.ID
```

```
In [26]: ;join -v1 G4.ID genotype.ID > G4.noGenotype.ID
```

```
In [27]: ;join -v1 G5.ID genotype.ID > G5.noGenotype.ID
```

```
In [28]: ;wc G0.Genotype.ID;wc G1.Genotype.ID;wc G2.Genotype.ID;wc G3.Genotype.ID;wc G4.Genotype.ID;wc G5.Genotype
200 200 1200 G0.Genotype.ID
200 200 1200 G1.Genotype.ID
200 200 1200 G2.Genotype.ID
200 200 1200 G3.Genotype.ID
200 200 1200 G4.Genotype.ID
8000 8000 48000 G5.Genotype.ID
```

```
In [29]: ;wc G0.noGenotype.ID;wc G1.noGenotype.ID;wc G2.noGenotype.ID;wc G3.noGenotype.ID;wc G4.noGenotype.ID;wc G
7800 7800 46800 G0.noGenotype.ID
7800 7800 46800 G1.noGenotype.ID
7800 7800 46800 G2.noGenotype.ID
7800 7800 46800 G3.noGenotype.ID
7800 7800 46800 G4.noGenotype.ID
0 0 0 G5.noGenotype.ID
```

```
In [30]: ped,A_Mats,numSSBayes = calc_Ai("PedAll.txt","genotype.ID",calculateInbreeding=false)
nothing
df      = read_genotypes("GenNF.txt",numSSBayes)
M_Mats = make_MMats(df,A_Mats,ped);                # without centering
y_Vecs = make_yVecs("sim.phenotype",ped,numSSBayes)
J_Vecs = make_JVecs(numSSBayes,A_Mats)
Z_Mats = make_ZMats(ped,y_Vecs,numSSBayes)
X_Mats, W_Mats = make_XWMats(J_Vecs,Z_Mats,M_Mats,numSSBayes)    # with J
nothing
```

```
In [31]: vG      = 0.738
         vRes    = 0.738
         nIter   = 50000
         @time aHat1,alphaHat,betaHat,epsiHat =
         ssGibbs(M_Mats,y_Vecs,J_Vecs,Z_Mats,X_Mats,W_Mats,A_Mats, numSSBayes,vRes,vG,nIter, outFreq=5000);
         nothing

         This is iteration 5000
         This is iteration 10000
         This is iteration 15000
         This is iteration 20000
         This is iteration 25000
         This is iteration 30000
         This is iteration 35000
         This is iteration 40000
         This is iteration 45000
         This is iteration 50000
         7069.523221 seconds (23.87 G allocations: 737.191 GB, 2.71% gc time)
```

```
In [32]: betaHat
```

```
Out[32]: 2-element Array{Float64,1}:
          30.3881
           2.77083
```

```
In [33]: mu  = betaHat[1]
         mug = betaHat[2]
```

```
Out[33]: 2.770827894161224
```

```
In [34]: (mu+mug)/2
```

```
Out[34]: 16.579476012797446
```

```
In [35]: alphaHat
```

```
Out[35]: 2000-element Array{Float64,1}:
 0.00508143
-0.00826099
 0.0150103
-0.00529992
-0.00603192
-0.00609696
 0.00721623
 0.00461034
 0.00956295
-0.0125825
-0.0106371
 0.0336024
 0.0115256
  ⋮
-0.0198089
 0.0194054
-0.0224459
-0.0177727
 0.013777
 0.0146191
 0.00681582
 0.00741613
-0.00195034
-0.00869803
 0.0227777
 0.00485858
```

```
In [36]: writedlm("alphaEstimates",alphaHat)
```

```
In [37]: using DataFrames
```

```
In [38]: df = readtable("sim.bv", eltypes=[UTF8String, Float64], separator = ' ',header=false)
a = Array{Float64,numSSBayes.num_ped}
for (i,ID) in enumerate(df[:,1])
    j = ped.idMap[ID].seqID
    a[j] = df[i,2]
end
```

```
In [39]: IDs = readtable("all.ID", eltypes =[UTF8String], separator = ' ',header=false)
posAi = getPos(ped,IDs)
cor1 = cor(a[posAi],aHat1[posAi])[1,1]
reg1 = linreg(aHat1[posAi], a[posAi])[2,1]
@printf("SSBRJC from Gibbs - all.ID : correlation = %6.3f\n", cor1 ) # with epsilon
@printf("SSBRJC from Gibbs - all.ID : regression of TBV on GEBV = %6.3f\n", reg1)
JCall = cor1
```

```
SSBRJC from Gibbs - all.ID : correlation = 0.915
SSBRJC from Gibbs - all.ID : regression of TBV on GEBV = 0.989
```

```
Out[39]: 0.9153176599402923
```

```
In [40]: TBV = a[posAi]
mean(TBV)
```

```
Out[40]: 32.00853329166667
```

```
In [41]: GEBV = aHat1[posAi]
mean(GEBV)
```

```
Out[41]: 1.6200906655350737
```

```
In [42]: IDs = readtable("genotype.ID", eltypes =[UTF8String], separator = ' ',header=false)
posAi = getPos(ped,IDs)
cor2 = cor(a[posAi],aHat1[posAi])[1,1]
reg2 = linreg(aHat1[posAi], a[posAi])[2,1]
@printf("SSBRJC from Gibbs - genotype.ID : correlation = %6.3f\n", cor2 ) # with epsilon
@printf("SSBRJC from Gibbs - genotype.ID : regression of TBV on GEBV = %6.3f\n", reg2)
JCall = cor2
```

```
SSBRJC from Gibbs - genotype.ID : correlation = 0.919
SSBRJC from Gibbs - genotype.ID : regression of TBV on GEBV = 1.086
```

```
Out[42]: 0.918658222980931
```

```
In [43]: TBV = a[posAi]
mean(TBV)
```

```
Out[43]: 33.31851788888889
```

```
In [44]: GEBV = aHat1[posAi]
         mean(GEBV)
```

```
Out[44]: 2.9149600023591677
```

```
In [45]: IDs = readtable("noGenotype.ID", eltypes =[UTF8String], separator = ' ',header=false)
         posAi = getPos(ped,IDs)
         cor3 = cor(a[posAi],aHat1[posAi])[1,1]
         reg3 = linreg(aHat1[posAi], a[posAi])[2,1]
         @printf("SSBRJC from Gibbs - noGenotype.ID : correlation = %6.3f\n", cor3 ) # with epsilon
         @printf("SSBRJC from Gibbs - noGenotype.ID : regression of TBV on GEBV = %6.3f\n", reg3)
         JCall = cor3
```

```
SSBRJC from Gibbs - noGenotype.ID : correlation = 0.880
```

```
SSBRJC from Gibbs - noGenotype.ID : regression of TBV on GEBV = 0.968
```

```
Out[45]: 0.8803453332895284
```

```
In [46]: TBV = a[posAi]
         mean(TBV)
```

```
Out[46]: 31.706229153846152
```

```
In [47]: GEBV = aHat1[posAi]
         mean(GEBV)
```

```
Out[47]: 1.321274664729513
```

```
In [48]: IDs = readtable("G0.ID", eltypes =[UTF8String], separator = ' ',header=false)
         posAi = getPos(ped,IDs)
         cor4 = cor(a[posAi],aHat1[posAi])[1,1]
         reg4 = linreg(aHat1[posAi], a[posAi])[2,1]
         @printf("SSBRJC from Gibbs - G0.ID : correlation = %6.3f\n", cor4 ) # with epsilon
         @printf("SSBRJC from Gibbs - G0.ID : regression of TBV on GEBV = %6.3f\n", reg4)
         JCall = cor4
```

```
SSBRJC from Gibbs - G0.ID : correlation = 0.709
```

```
SSBRJC from Gibbs - G0.ID : regression of TBV on GEBV = 0.887
```

```
Out[48]: 0.7088391268119127
```



```
In [49]: TBV = a[posAi]
        G0TBV=mean(TBV)
```

```
Out[49]: 30.604240875000002
```

```
In [50]: GEBV = aHat1[posAi]
        G0GEBV=mean(GEBV)
```

```
Out[50]: 0.13070682454444557
```

```
In [51]: IDs = readtable("G1.ID", eltypes =[UTF8String], separator = ' ',header=false)
        posAi = getPos(ped,IDs)
        cor4 = cor(a[posAi],aHat1[posAi])[1,1]
        reg4 = linreg(aHat1[posAi], a[posAi])[2,1]
        @printf("SSBRJC from Gibbs - G1.ID : correlation = %6.3f\n", cor4 ) # with epsilon
        @printf("SSBRJC from Gibbs - G1.ID : regression of TBV on GEBV = %6.3f\n", reg4)
        JCall = cor4
```

```
SSBRJC from Gibbs - G1.ID : correlation =  0.776
SSBRJC from Gibbs - G1.ID : regression of TBV on GEBV =  0.988
```

```
Out[51]: 0.7756998192849542
```

```
In [52]: TBV = a[posAi]
        G1TBV=mean(TBV)
```

```
Out[52]: 31.180672250000004
```

```
In [53]: GEBV = aHat1[posAi]
        G1GEBV=mean(GEBV)
```

```
Out[53]: 0.8217925657326018
```

```
In [54]: IDs = readtable("G2.ID", eltypes =[UTF8String], separator = ' ',header=false)
posAi = getPos(ped,IDs)
cor5 = cor(a[posAi],aHat1[posAi])[1,1]
reg5 = linreg(aHat1[posAi], a[posAi])[2,1]
@printf("SSBRJC from Gibbs - G2.ID : correlation = %6.3f\n", cor5 ) # with epsilon
@printf("SSBRJC from Gibbs - G2.ID : regression of TBV on GEBV = %6.3f\n", reg5)
JCall = cor5
```

```
SSBRJC from Gibbs - G2.ID : correlation = 0.777
SSBRJC from Gibbs - G2.ID : regression of TBV on GEBV = 1.013
```

```
Out[54]: 0.7770832696317995
```

```
In [55]: TBV = a[posAi]
G2TBV=mean(TBV)
```

```
Out[55]: 31.753910875000003
```

```
In [56]: GEBV = aHat1[posAi]
G2GEBV=mean(GEBV)
```

```
Out[56]: 1.3991954816585088
```

```
In [57]: IDs = readtable("G3.ID", eltypes =[UTF8String], separator = ' ',header=false)
posAi = getPos(ped,IDs)
cor6 = cor(a[posAi],aHat1[posAi])[1,1]
reg6 = linreg(aHat1[posAi], a[posAi])[2,1]
@printf("SSBRJC from Gibbs - G3.ID : correlation = %6.3f\n", cor6 ) # with epsilon
@printf("SSBRJC from Gibbs - G3.ID : regression of TBV on GEBV = %6.3f\n", reg6)
JCall = cor6
```

```
SSBRJC from Gibbs - G3.ID : correlation = 0.775
SSBRJC from Gibbs - G3.ID : regression of TBV on GEBV = 1.026
```

```
Out[57]: 0.7747667508148358
```

```
In [58]: TBV = a[posAi]
G3TBV=mean(TBV)
```

```
Out[58]: 32.31113225
```

```
In [59]: GEBV = aHat1[posAi]
        G3GEBV=mean(GEBV)
```

```
Out[59]: 1.9551624281957094
```

```
In [60]: IDs = readtable("G4.ID", eltypes =[UTF8String], separator = ' ',header=false)
        posAi = getPos(ped,IDs)
        cor7 = cor(a[posAi],aHat1[posAi])[1,1]
        reg7 = linreg(aHat1[posAi], a[posAi])[2,1]
        @printf("SSBRJC from Gibbs - G4.ID : correlation = %6.3f\n", cor7 ) # with epsilon
        @printf("SSBRJC from Gibbs - G4.ID : regression of TBV on GEBV = %6.3f\n", reg7)
        JCall = cor7
```

```
SSBRJC from Gibbs - G4.ID : correlation =  0.780
SSBRJC from Gibbs - G4.ID : regression of TBV on GEBV =  1.026
```

```
Out[60]: 0.779796132097834
```

```
In [61]: TBV = a[posAi]
        G4TBV=mean(TBV)
```

```
Out[61]: 32.82390337499999
```

```
In [62]: GEBV = aHat1[posAi]
        G4GEBV=mean(GEBV)
```

```
Out[62]: 2.447554656264282
```

```
In [63]: IDs = readtable("G5.ID", eltypes =[UTF8String], separator = ' ',header=false)
        posAi = getPos(ped,IDs)
        cor8 = cor(a[posAi],aHat1[posAi])[1,1]
        reg8 = linreg(aHat1[posAi], a[posAi])[2,1]
        @printf("SSBRJC from Gibbs - G5.ID : correlation = %6.3f\n", cor8 ) # with epsilon
        @printf("SSBRJC from Gibbs - G5.ID : regression of TBV on GEBV = %6.3f\n", reg8)
        JCall = cor8
```

```
SSBRJC from Gibbs - G5.ID : correlation =  0.904
SSBRJC from Gibbs - G5.ID : regression of TBV on GEBV =  1.073
```

```
Out[63]: 0.9035388435285915
```

```
In [64]: TBV = a[posAi]
         G5TBV=mean(TBV)
```

```
Out[64]: 33.37734012499999
```

```
In [65]: GEBV = aHat1[posAi]
         G5GEBV=mean(GEBV)
```

```
Out[65]: 2.9661320368148925
```

```
In [66]: IDs = readtable("G0.Genotype.ID", eltypes =[UTF8String], separator = ' ',header=false)
         posAi = getPos(ped,IDs)
         cor9 = cor(a[posAi],aHat1[posAi])[1,1]
         reg9 = linreg(aHat1[posAi], a[posAi])[2,1]
         @printf("SSBRJC from Gibbs - G0.Genotype.ID : correlation = %6.3f\n", cor9 ) # with epsilon
         @printf("SSBRJC from Gibbs - G0.Genotype.ID : regression of TBV on GEBV = %6.3f\n", reg9)
         JCall = cor9
```

```
SSBRJC from Gibbs - G0.Genotype.ID : correlation =  0.932
SSBRJC from Gibbs - G0.Genotype.ID : regression of TBV on GEBV =  1.071
```

```
Out[66]: 0.9322941795112342
```

```
In [67]: TBV = a[posAi]
         mean(TBV)
```

```
Out[67]: 31.773559999999996
```

```
In [68]: GEBV = aHat1[posAi]
         mean(GEBV)
```

```
Out[68]: 1.5875184991996962
```

```
In [69]: IDs = readtable("G1.Genotype.ID", eltypes =[UTF8String], separator = ' ',header=false)
posAi = getPos(ped,IDs)
cor9 = cor(a[posAi],aHat1[posAi])[1,1]
reg9 = linreg(aHat1[posAi], a[posAi])[2,1]
@printf("SSBRJC from Gibbs - G1.Genotype.ID : correlation = %6.3f\n", cor9 ) # with epsilon
@printf("SSBRJC from Gibbs - G1.Genotype.ID : regression of TBV on GEBV = %6.3f\n", reg9)
JCall = cor9
```

```
SSBRJC from Gibbs - G1.Genotype.ID : correlation = 0.943
SSBRJC from Gibbs - G1.Genotype.ID : regression of TBV on GEBV = 1.095
```

```
Out[69]: 0.9430646141678916
```

```
In [70]: TBV = a[posAi]
mean(TBV)
```

```
Out[70]: 32.321934999999996
```

```
In [71]: GEBV = aHat1[posAi]
mean(GEBV)
```

```
Out[71]: 2.034673070127823
```

```
In [72]: IDs = readtable("G2.Genotype.ID", eltypes =[UTF8String], separator = ' ',header=false)
posAi = getPos(ped,IDs)
cor10 = cor(a[posAi],aHat1[posAi])[1,1]
reg10 = linreg(aHat1[posAi], a[posAi])[2,1]
@printf("SSBRJC from Gibbs - G2.Genotype.ID : correlation = %6.3f\n", cor10 ) # with epsilon
@printf("SSBRJC from Gibbs - G2.Genotype.ID : regression of TBV on GEBV = %6.3f\n", reg10)
JCall = cor10
```

```
SSBRJC from Gibbs - G2.Genotype.ID : correlation = 0.940
SSBRJC from Gibbs - G2.Genotype.ID : regression of TBV on GEBV = 1.084
```

```
Out[72]: 0.9399408396211534
```

```
In [73]: TBV = a[posAi]
mean(TBV)
```

```
Out[73]: 32.875784999999999
```

```
In [74]: GEBV = aHat1[posAi]
         mean(GEBV)
```

```
Out[74]: 2.5437382191723428
```

```
In [75]: IDs = readtable("G3.Genotype.ID", eltypes =[UTF8String], separator = ' ',header=false)
         posAi = getPos(ped,IDs)
         cor11 = cor(a[posAi],aHat1[posAi])[1,1]
         reg11 = linreg(aHat1[posAi], a[posAi])[2,1]
         @printf("SSBRJC from Gibbs - G3.Genotype.ID : correlation = %6.3f\n", cor11 ) # with epsilon
         @printf("SSBRJC from Gibbs - G3.Genotype.ID : regression of TBV on GEBV = %6.3f\n", reg11)
         JCA11 = cor11
```

```
SSBRJC from Gibbs - G3.Genotype.ID : correlation = 0.943
SSBRJC from Gibbs - G3.Genotype.ID : regression of TBV on GEBV = 1.080
```

```
Out[75]: 0.9428271510655124
```

```
In [76]: TBV = a[posAi]
         mean(TBV)
```

```
Out[76]: 33.35545
```

```
In [77]: GEBV = aHat1[posAi]
         mean(GEBV)
```

```
Out[77]: 2.9330443562601425
```

```
In [78]: IDs = readtable("G4.Genotype.ID", eltypes =[UTF8String], separator = ' ',header=false)
         posAi = getPos(ped,IDs)
         cor12 = cor(a[posAi],aHat1[posAi])[1,1]
         reg12 = linreg(aHat1[posAi], a[posAi])[2,1]
         @printf("SSBRJC from Gibbs - G4.Genotype.ID : correlation = %6.3f\n", cor12 ) # with epsilon
         @printf("SSBRJC from Gibbs - G4.Genotype.ID : regression of TBV on GEBV = %6.3f\n", reg12)
         JCA11 = cor12
```

```
SSBRJC from Gibbs - G4.Genotype.ID : correlation = 0.866
SSBRJC from Gibbs - G4.Genotype.ID : regression of TBV on GEBV = 1.076
```

```
Out[78]: 0.8663691346230445
```

```
In [79]: TBV = a[posAi]
         mean(TBV)
```

```
Out[79]: 33.91297
```

```
In [80]: GEBV = aHat1[posAi]
         mean(GEBV)
```

```
Out[80]: 3.4289444888068363
```

```
In [81]: IDs = readtable("G5.Genotype.ID", eltypes =[UTF8String], separator = ' ',header=false)
         posAi = getPos(ped,IDs)
         cor13 = cor(a[posAi],aHat1[posAi])[1,1]
         reg13 = linreg(aHat1[posAi], a[posAi])[2,1]
         @printf("SSBRJC from Gibbs - G5.Genotype.ID : correlation = %6.3f\n", cor13 ) # with epsilon
         @printf("SSBRJC from Gibbs - G5.Genotype.ID : regression of TBV on GEBV = %6.3f\n", reg13)
         JCall = cor13
```

```
SSBRJC from Gibbs - G5.Genotype.ID : correlation = 0.904
```

```
SSBRJC from Gibbs - G5.Genotype.ID : regression of TBV on GEBV = 1.073
```

```
Out[81]: 0.9035388435285915
```

```
In [82]: writedlm("Correlation.G5.G.J.txt",cor13)
```

```
In [83]: writedlm("Regression.G5.G.J.txt",reg13)
```

```
In [84]: TBVG5Gall = a[posAi]
         TBVG5G=mean(TBVG5Gall)
```

```
Out[84]: 33.37734012499999
```

```
In [85]: GEBVG5Gall = aHat1[posAi]
         GEBVG5G=mean(GEBVG5Gall)
```

```
Out[85]: 2.9661320368148925
```

```
In [86]: IDs = readtable("G0.noGenotype.ID", eltypes =[UTF8String], separator = ' ',header=false)
posAi = getPos(ped,IDs)
cor14 = cor(a[posAi],aHat1[posAi])[1,1]
reg14 = linreg(aHat1[posAi], a[posAi])[2,1]
@printf("SSBRJC from Gibbs - G0.noGenotype.ID : correlation = %6.3f\n", cor14 ) # with epsilon
@printf("SSBRJC from Gibbs - G0.noGenotype.ID : regression of TBV on GEBV = %6.3f\n", reg14)
JCall = cor14
```

```
SSBRJC from Gibbs - G0.noGenotype.ID : correlation =  0.687
SSBRJC from Gibbs - G0.noGenotype.ID : regression of TBV on GEBV =  0.895
```

```
Out[86]: 0.6872438773786227
```

```
In [87]: TBV = a[posAi]
mean(TBV)
```

```
Out[87]: 30.57425833333334
```

```
In [88]: GEBV = aHat1[posAi]
mean(GEBV)
```

```
Out[88]: 0.09335267904046479
```

```
In [89]: IDs = readtable("G1.noGenotype.ID", eltypes =[UTF8String], separator = ' ',header=false)
posAi = getPos(ped,IDs)
cor14 = cor(a[posAi],aHat1[posAi])[1,1]
reg14 = linreg(aHat1[posAi], a[posAi])[2,1]
@printf("SSBRJC from Gibbs - G1.noGenotype.ID : correlation = %6.3f\n", cor14 ) # with epsilon
@printf("SSBRJC from Gibbs - G1.noGenotype.ID : regression of TBV on GEBV = %6.3f\n", reg14)
JCall = cor14
```

```
SSBRJC from Gibbs - G1.noGenotype.ID : correlation =  0.758
SSBRJC from Gibbs - G1.noGenotype.ID : regression of TBV on GEBV =  0.991
```

```
Out[89]: 0.7578989337782382
```

```
In [90]: TBV = a[posAi]
mean(TBV)
```

```
Out[90]: 31.151409102564106
```



```
In [91]: GEBV = aHat1[posAi]
         mean(GEBV)
```

```
Out[91]: 0.7906930656199037
```

```
In [92]: IDs = readtable("G2.noGenotype.ID", eltypes =[UTF8String], separator = ' ',header=false)
         posAi = getPos(ped,IDs)
         cor15 = cor(a[posAi],aHat1[posAi])[1,1]
         reg15 = linreg(aHat1[posAi], a[posAi])[2,1]
         @printf("SSBRJC from Gibbs - G2.noGenotype.ID : correlation = %6.3f\n", cor15 ) # with epsilon
         @printf("SSBRJC from Gibbs - G2.noGenotype.ID : regression of TBV on GEBV = %6.3f\n", reg15)
         JCA11 = cor15
```

```
SSBRJC from Gibbs - G2.noGenotype.ID : correlation =  0.760
SSBRJC from Gibbs - G2.noGenotype.ID : regression of TBV on GEBV =  1.015
```

```
Out[92]: 0.7603029289591507
```

```
In [93]: TBV = a[posAi]
         mean(TBV)
```

```
Out[93]: 31.72514487179487
```

```
In [94]: GEBV = aHat1[posAi]
         mean(GEBV)
```

```
Out[94]: 1.369848231978667
```

```
In [95]: IDs = readtable("G3.noGenotype.ID", eltypes =[UTF8String], separator = ' ',header=false)
         posAi = getPos(ped,IDs)
         cor16 = cor(a[posAi],aHat1[posAi])[1,1]
         reg16 = linreg(aHat1[posAi], a[posAi])[2,1]
         @printf("SSBRJC from Gibbs - G3.noGenotype.ID : correlation = %6.3f\n", cor16 ) # with epsilon
         @printf("SSBRJC from Gibbs - G3.noGenotype.ID : regression of TBV on GEBV = %6.3f\n", reg16)
         JCA11 = cor16
```

```
SSBRJC from Gibbs - G3.noGenotype.ID : correlation =  0.759
SSBRJC from Gibbs - G3.noGenotype.ID : regression of TBV on GEBV =  1.021
```

```
Out[95]: 0.75902867003697
```

```
In [96]: TBV = a[posAi]
         mean(TBV)
```

```
Out[96]: 32.284354871794875
```

```
In [97]: GEBV = aHat1[posAi]
         mean(GEBV)
```

```
Out[97]: 1.9300885326043136
```

```
In [98]: IDs = readtable("G4.noGenotype.ID", eltypes =[UTF8String], separator = ' ',header=false)
         posAi = getPos(ped,IDs)
         cor17 = cor(a[posAi],aHat1[posAi])[1,1]
         reg17 = linreg(aHat1[posAi], a[posAi])[2,1]
         @printf("SSBRJC from Gibbs - G4.noGenotype.ID : correlation = %6.3f\n", cor17 ) # with epsilon
         @printf("SSBRJC from Gibbs - G4.noGenotype.ID : regression of TBV on GEBV = %6.3f\n", reg17)
         JCall = cor17
```

```
SSBRJC from Gibbs - G4.noGenotype.ID : correlation =  0.765
SSBRJC from Gibbs - G4.noGenotype.ID : regression of TBV on GEBV =  1.019
```

```
Out[98]: 0.7649581091324602
```

```
In [99]: TBV = a[posAi]
         mean(TBV)
```

```
Out[99]: 32.795978589743584
```

```
In [100]: GEBV = aHat1[posAi]
          mean(GEBV)
```

```
Out[100]: 2.4223908144042166
```

```
In [101]: IDs = readtable("G5.noGenotype.ID", eltypes =[UTF8String], separator = ' ',header=false)
posAi = getPos(ped,IDs)
cor18 = cor(a[posAi],aHat1[posAi])[1,1]
reg18 = linreg(aHat1[posAi], a[posAi])[2,1]
@printf("SSBRJC from Gibbs - G5.noGenotype.ID : correlation = %6.3f\n", cor18 ) # with epsilon
@printf("SSBRJC from Gibbs - G5.noGenotype.ID : regression of TBV on GEBV = %6.3f\n", reg18)
JCA11 = cor17
```

```
LoadError: BoundsError: attempt to access 0-element Array{UInt8,1}
  at index [1]
while loading In[101], in expression starting on line 1
```

```
[inlined code] from /home/nicole/.julia/v0.4/DataFrames/src/dataframe/io.jl:167
in readnrows! at /home/nicole/.julia/v0.4/DataFrames/src/dataframe/io.jl:222
in readtable! at /home/nicole/.julia/v0.4/DataFrames/src/dataframe/io.jl:774
in readtable at /home/nicole/.julia/v0.4/DataFrames/src/dataframe/io.jl:862
in readtable at /home/nicole/.julia/v0.4/DataFrames/src/dataframe/io.jl:956
```

```
In [102]: TBVG5NGall = a[posAi]
TBVG5NG=mean(TBVG5NGall)
```

```
Out[102]: 32.795978589743584
```

```
In [103]: GEBVG5NGall = aHat1[posAi]
GEBVG5NG=mean(GEBVG5NGall)
```

```
Out[103]: 2.4223908144042166
```

```
In [104]: numSSBayes
```

```
Out[104]: SSBR.NumSSBayes(54925,45925,9000,40000,39000,1000,2000)
```

```
In [105]: J_Vecs.J1
```

```
Out[105]: 45925x1 Array{Float64,2}:  
  1.67981e-18  
  0.0  
  0.0  
 -0.915914  
 -0.514938  
 -0.501463  
 -0.5  
 -0.752048  
 -0.768691  
 -0.752036  
 -0.00117096  
 -0.752203  
 -0.962611  
  ⋮  
 -0.965517  
  1.0234e-18  
 -0.756583  
 -0.752181  
 -0.81402  
  2.5972e-19  
 -0.962551  
 -0.53765  
 -0.887784  
 -0.886076  
 -0.00108878  
 -0.00175379
```

```
In [106]: sortrows(J_Vecs.J1[end-8000:end,:])
```

```
Out[106]: 8001x1 Array{Float64,2}:
```

```
-0.98691  
-0.985891  
-0.985699  
-0.985033  
-0.984936  
-0.984607  
-0.984028  
-0.983228  
-0.982739  
-0.982612  
-0.98133  
-0.98131  
-0.981261  
:  
5.55108e-17  
5.55112e-17  
5.55356e-17  
5.56174e-17  
5.5633e-17  
5.57116e-17  
5.57219e-17  
5.73711e-17  
6.62163e-17  
7.4063e-17  
8.80206e-17  
8.86914e-17
```

```
In [107]: J1 = sortrows(J_Vecs.J1)
```

```
Out[107]: 45925x1 Array{Float64,2}:  
  -0.990466  
  -0.98691  
  -0.986901  
  -0.986424  
  -0.985891  
  -0.985699  
  -0.985612  
  -0.985507  
  -0.985465  
  -0.985346  
  -0.985033  
  -0.984936  
  -0.984607  
  ⋮  
  6.61746e-17  
  6.62163e-17  
  6.63612e-17  
  6.68603e-17  
  7.39236e-17  
  7.4063e-17  
  7.43457e-17  
  7.82232e-17  
  8.35525e-17  
  8.5388e-17  
  8.80206e-17  
  8.86914e-17
```

```
In [108]: J1[J1 .< 0.0,:]
```

```
Out[108]: 43960x1 Array{Float64,2}:  
  -0.990466  
  -0.98691  
  -0.986901  
  -0.986424  
  -0.985891  
  -0.985699  
  -0.985612  
  -0.985507  
  -0.985465  
  -0.985346  
  -0.985033  
  -0.984936  
  -0.984607  
  ⋮  
  -1.43764e-35  
  -1.41176e-35  
  -1.39743e-35  
  -7.24667e-36  
  -7.2166e-36  
  -7.2166e-36  
  -7.2166e-36  
  -7.21659e-36  
  -7.65563e-65  
  -5.11434e-65  
  -3.82782e-65  
  -1.77903e-67
```

```
In [109]: J1[J1 .> 0.0,:]
```

```
Out[109]: 1265x1 Array{Float64,2}:  
 8.49946e-81  
 8.01203e-52  
 1.60241e-51  
 1.60241e-51  
 1.60335e-51  
 1.60908e-51  
 2.1823e-51  
 3.10293e-51  
 3.19221e-51  
 3.2067e-51  
 4.69575e-51  
 4.69575e-51  
 4.82179e-51  
 ⋮  
 6.61746e-17  
 6.62163e-17  
 6.63612e-17  
 6.68603e-17  
 7.39236e-17  
 7.4063e-17  
 7.43457e-17  
 7.82232e-17  
 8.35525e-17  
 8.5388e-17  
 8.80206e-17  
 8.86914e-17
```

```
In [110]: G = convert(Array,readtable("GenNF.txt", separator = ' ',header=false));
```

```
In [111]: GAll=mean(G[:,2:end],1)
```

```
Out[111]: 1x2000 Array{Float64,2}:  
 0.202778  1.57578  0.675222  1.84978  1.593  ...  0.649222  1.05878  0.603556
```

```
In [112]: GG0=mean(G[1:200,2:end],1)
```

```
Out[112]: 1x2000 Array{Float64,2}:  
 0.115  1.585  0.67  1.875  1.61  0.28  ...  1.315  0.485  0.685  0.94  0.6
```



```
In [113]: GG1=mean(G[201:400,2:end],1)
```

```
Out[113]: 1x2000 Array{Float64,2}:  
 0.14  1.615  0.685  1.86  1.54  0.27  ...  1.33  0.465  0.685  0.975  0.545
```

```
In [114]: GG2=mean(G[401:600,2:end],1)
```

```
Out[114]: 1x2000 Array{Float64,2}:  
 0.2  1.585  0.68  1.855  1.57  0.305  ...  1.29  0.495  0.73  0.915  0.54
```

```
In [115]: GG3=mean(G[601:800,2:end],1)
```

```
Out[115]: 1x2000 Array{Float64,2}:  
 0.205  1.56  0.72  1.83  1.55  0.255  ...  1.36  0.43  0.655  1.065  0.54
```

```
In [116]: GG4=mean(G[801:1000,2:end],1)
```

```
Out[116]: 1x2000 Array{Float64,2}:  
 0.21  1.545  0.7  1.84  1.595  0.22  ...  1.38  1.4  0.46  0.625  1.105  0.64
```

```
In [117]: GG5=mean(G[1001:9000,2:end],1)
```

```
Out[117]: 1x2000 Array{Float64,2}:  
 0.206375  1.5755  0.67325  1.8495  1.5955  ...  0.645875  1.06612  0.607375
```

```
In [118]: writedlm("meanOfSNPGAll",GAll)
```

```
In [119]: writedlm("meanOfSNPGG0",GG0)
```

```
In [120]: writedlm("meanOfSNPGG1",GG1)
```

```
In [121]: writedlm("meanOfSNPGG2",GG2)
```

```
In [122]: writedlm("meanOfSNPGG3",GG3)
```

```
In [123]: writedlm("meanOfSNPGG4",GG4)
```

```
In [124]: writedlm("meanOfSNPGG5",GG5)
```

