Progress report: No Wealth Accumulation (NWA)

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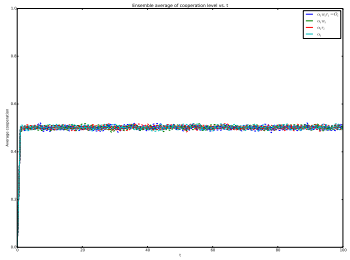
I implemented codes for both Nash eq. and simple learning simulations, in which the maximum contribution is fixed to a W_0 given in the *config.conf* file. Thus the grouping methods 1 and 3, as well as 2 and 4 became pairwise equivalent. Nevertheless at the moment I still simulated all of the grouping methods just to check the code.

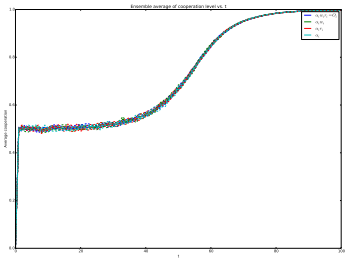
I some small sized ensemble simulations, with ensemble size being $NE = 10$ societies and each society having $N = 500$ players during $T = 100$ time steps. On figure 1 you'll see the comparison of Nash eq. simulations and simple learning simulations for equal talent (and no wealth accumulation). And on figures 2-4 you'll see a small parameter sweep for the beta parameter in the simple learning simulations. The beta parameter was ranged in $\beta = 0.05, 0.25, 0.5, 0.75, 1.0$.

I guess I might run some longer control simulations for the equal talent case. Maybe up to a $T = 200$ or so time steps, to see if something interesting happens later. This parametric sweep for beta was just a test. I think I should also look into larger beta values.

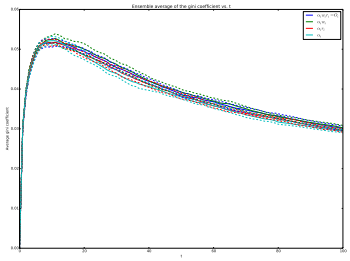
Interestingly, even though the grouping schemas 1&3 should give equivalent result, the main difference seen for the beta sweep for different betas is the change in the difference between gini coefficient for these two cases. I guess I still have to check trough the code and conduct some extra test runs (with different W_0 for example, at the moment I used $W_0 = 2.0$). Could this be a result of the sorting algorithm you used?



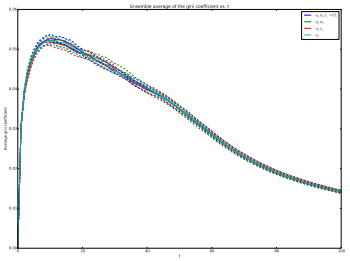
(a) Cooperation (Nash eq.)



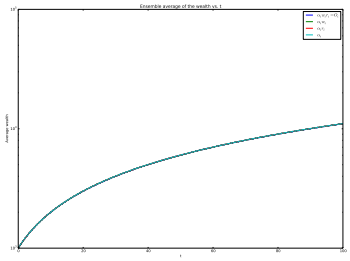
(b) Cooperation (Simple Learning)



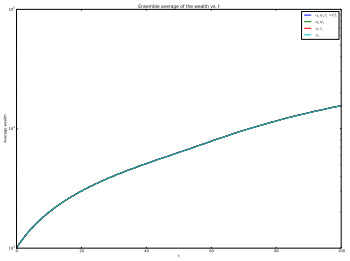
(c) Gini (Nash eq.)



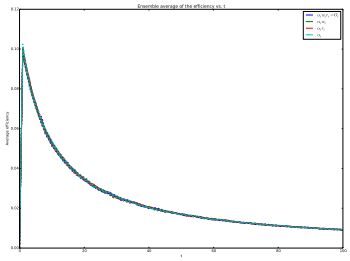
(d) Gini (Simple Learning)



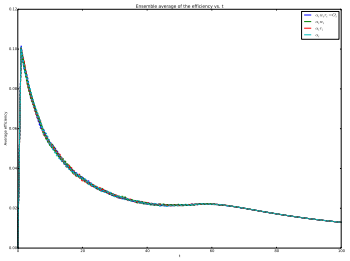
(e) Total wealth (Nash eq.)



(f) Total wealth (Simple Learning)

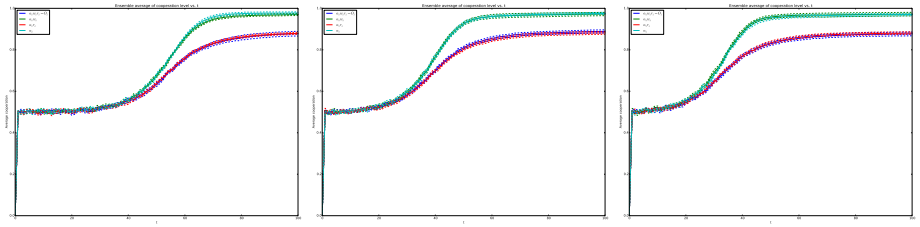


(g) Efficiency (Nash eq.)

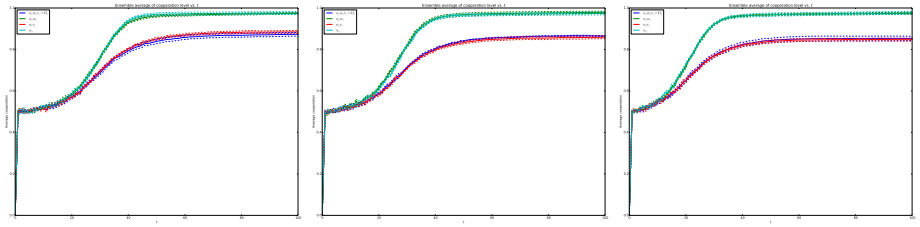


(h) Efficiency (Simple Learning)

Figure 1: Comparison of Nash eq. and simple learning simulations with no wealth accumulations and equal talent for all agents. NOTE: as both w_i and r_i are equal for all the agents, all of the grouping methods should give the same results, which is also seen on the plots. Number of agents $N = 500$, size of ensemble $NE = 10$, simulation duration $T = 100$, beta $\beta = 0.05$, learning parameter $\xi = 0.1$.

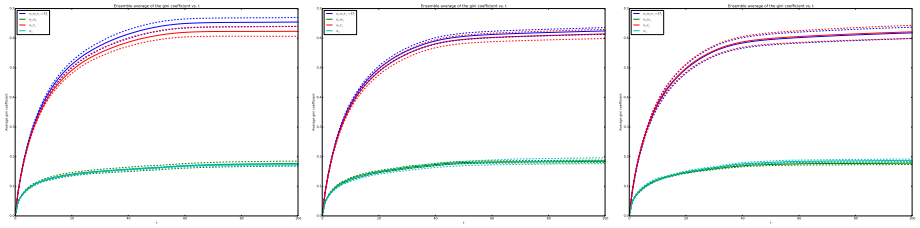


(a) Cooperation ($\beta = 0.05$) **(b)** Cooperation ($\beta = 0.25$) **(c)** Cooperation ($\beta = 0.5$)

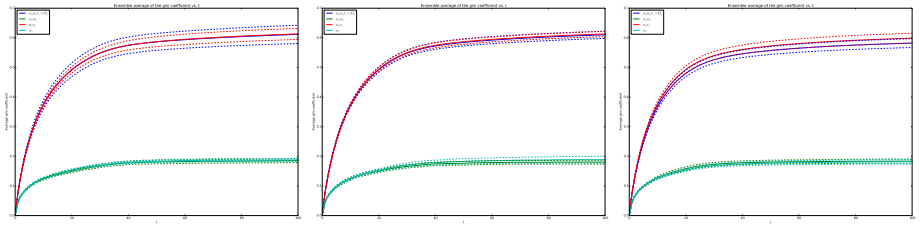


(d) Cooperation ($\beta = 0.75$) **(e)** Cooperation ($\beta = 1$) **(f)** Cooperation ($\beta = 2$)

Figure 2: Cooperation in beta scan for simple learning. NOTE: as w_i is equal for all the agents, grouping schemas 1&3 and 2&4 should give same (similar) results. Number of agents $N = 500$, size of ensemble $NE = 10$, simulation duration $T = 100$, learning parameter $\xi = 0.1$.

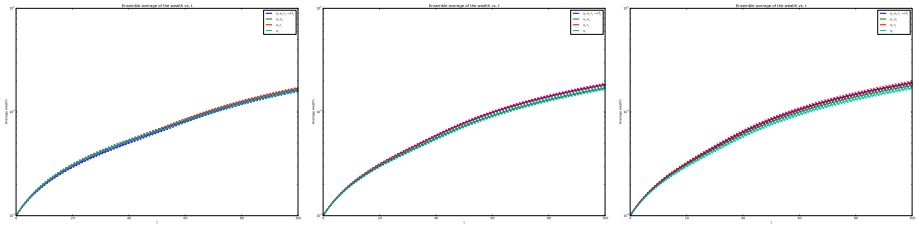


(a) Gini ($\beta = 0.05$) **(b)** Gini ($\beta = 0.25$) **(c)** Gini ($\beta = 0.5$)

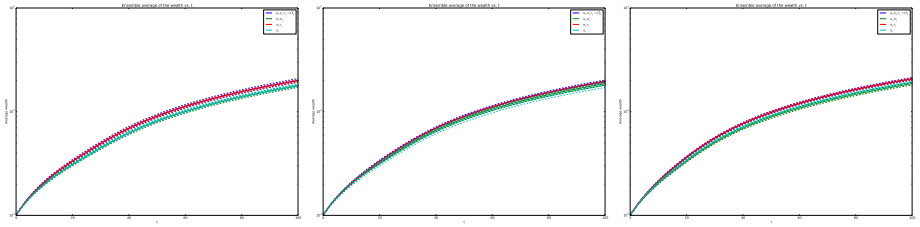


(d) Gini ($\beta = 0.75$) **(e)** Gini ($\beta = 1$) **(f)** Gini ($\beta = 2$)

Figure 3: Gini coef. in beta scan for simple learning. NOTE: as w_i is equal for all the agents, grouping schemas 1&3 and 2&4 should give same (similar) results. Number of agents $N = 500$, size of ensemble $NE = 10$, simulation duration $T = 100$, learning parameter $\xi = 0.1$.

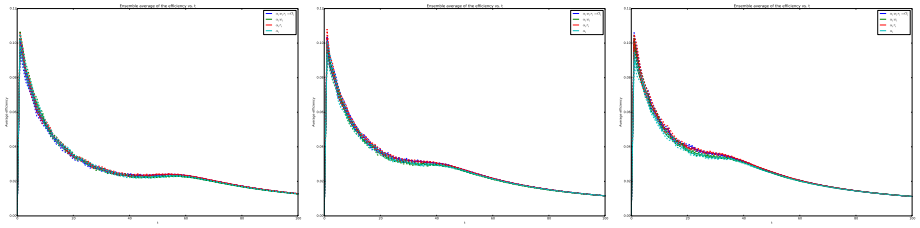


(a) Wealth ($\beta = 0.05$) **(b)** Wealth ($\beta = 0.25$) **(c)** Wealth ($\beta = 0.5$)

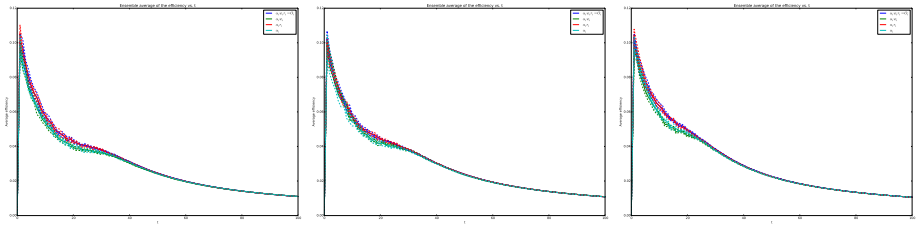


(d) Wealth ($\beta = 0.75$) **(e)** Wealth ($\beta = 1$) **(f)** Wealth ($\beta = 2$)

Figure 4: Total wealth in beta scan for simple learning. NOTE: as w_i is equal for all the agents, grouping schemas 1&3 and 2&4 should give same (similar) results. Number of agents $N = 500$, size of ensemble $NE = 10$, simulation duration $T = 100$, learning parameter $\xi = 0.1$.



(a) Efficiency ($\beta = 0.05$) **(b)** Efficiency ($\beta = 0.25$) **(c)** Efficiency ($\beta = 0.5$)



(d) Efficiency ($\beta = 0.75$) **(e)** Efficiency ($\beta = 1$) **(f)** Efficiency ($\beta = 2$)

Figure 5: Efficiency in beta scan for simple learning. NOTE: as w_i is equal for all the agents, grouping schemas 1&3 and 2&4 should give same (similar) results. Number of agents $N = 500$, size of ensemble $NE = 10$, simulation duration $T = 100$, learning parameter $\xi = 0.1$.