Optimal methods for mate-matching in a closed, discrete-time dynamic microsimulation model

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Background

ScotSim

Why closed?

Why discrete time?

Partnership formation

- Pool selection

- Pairing metric

- Pair matching

Previous work

Perese K (2002) 'Mate matching for microsimulation models', Paper 2002-3, Technical Paper Series, Congressional Budget Office, Washington DC.

Bacon B and Pennec S (2007) 'APPSIM – modelling family formation and dissolution', Working Paper 4, NATSEM, Canberra.

Leblanc N, Morrison R and Redway H (2009) 'A match-made in Silicon: marriage matching algorithms for dynamic microsimulation', paper presented at 2nd General Conference of the International Microsimulation Association, Ottawa, June 2009.

A summary

[1] Deterministic algorithms

Distributions of New First Marriages by (H-W) Age Difference: Previous Stochastic and Stable Algorithms and Census Data
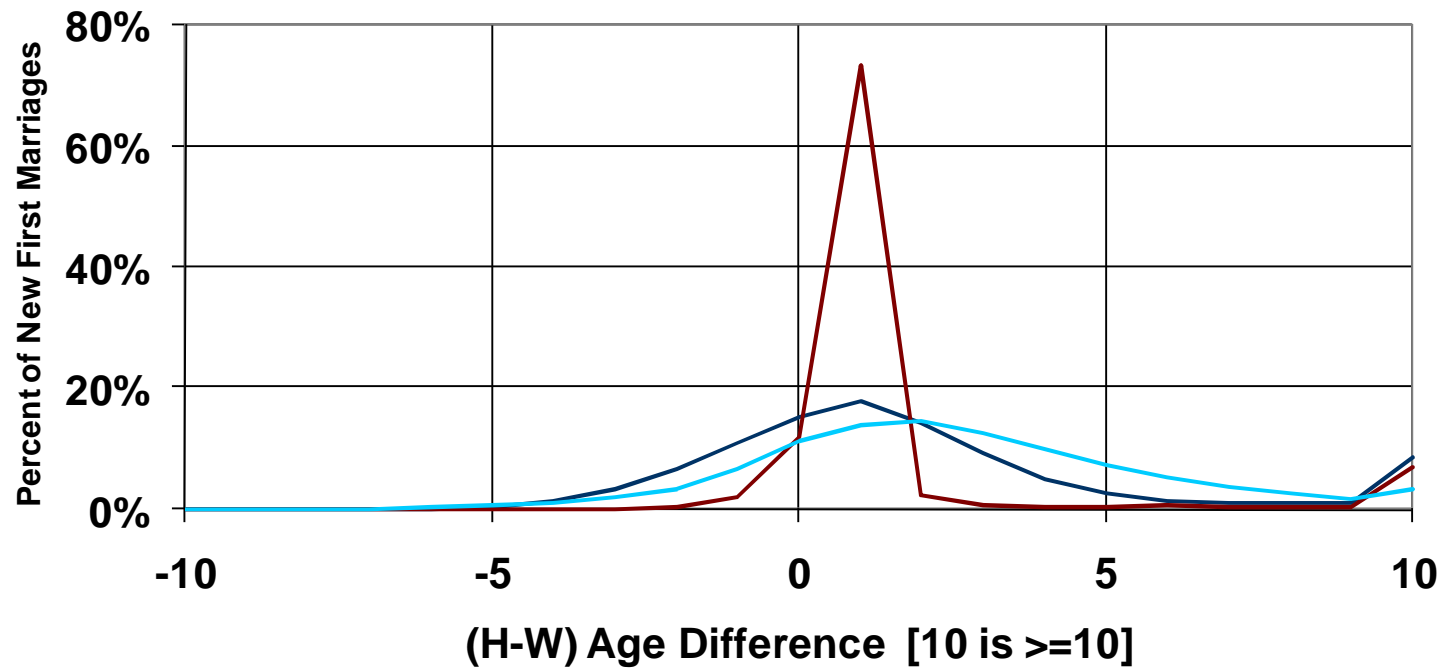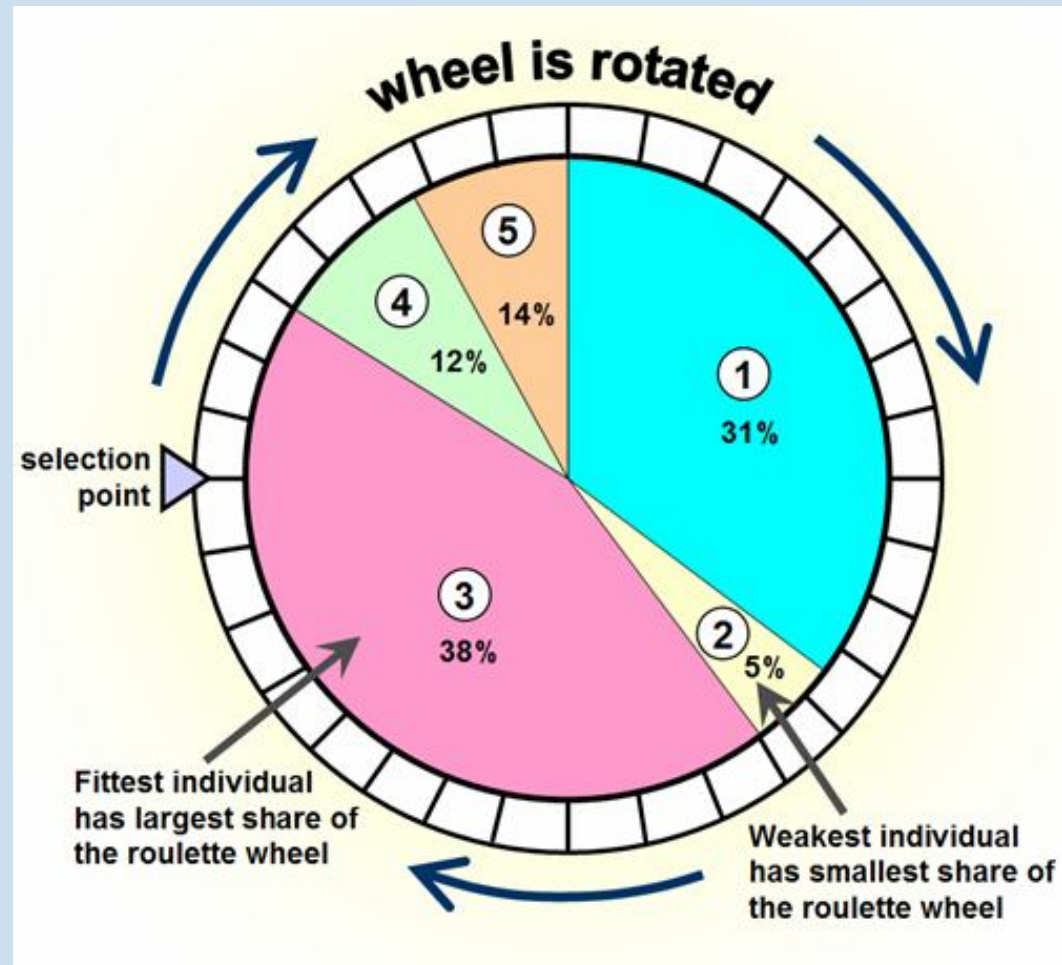
Variants:

(i)   Randomize start person
(ii) (Randomized) sub-pool of potential partners

Special cases:
(i) Tournament algorithm
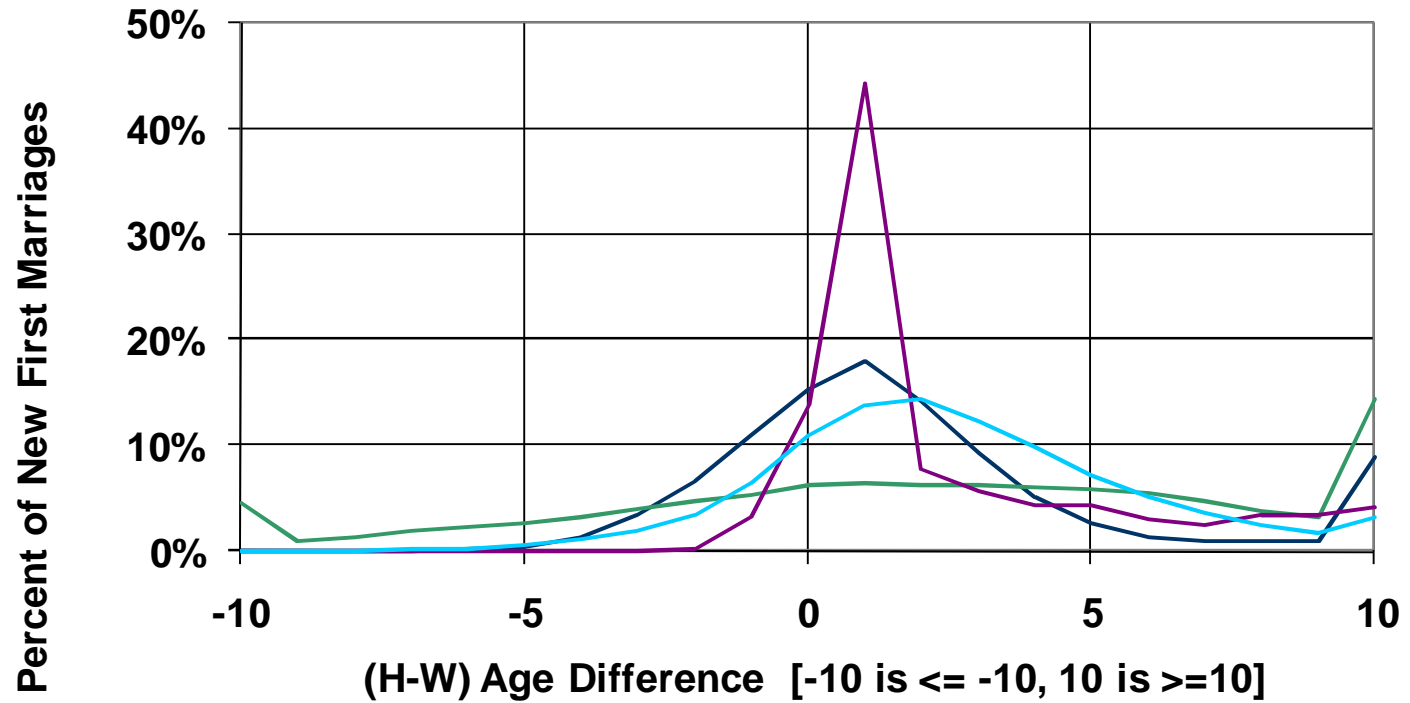(i)) Order of Decreasing Difficulty algorithm

[2] Stochastic algorithms

Variants:

(i)   Limiting potential pairings evaluated
(ii) Avoiding infinite draws

Special cases:
(i) Tournament algorithm
(i)) Order of Decreasing Difficulty algorithm

Distributions of New First Marriages by (H-W) Age Difference: Stochastic, T(10), & O.D.D. Algorithms, & Census Data

Problem solved?

A critique

- **Pairing metric based on 'recently-weds'**

- **No distinction between partnership types**

- **Operational ambiguity**

- **Impact of evolving population structure?**

- *Deterministic* **Tournaments?**

- **Unconsidered stochastic variants**

- **Interactions with pool generation and pairing metric?**

- **Evaluated mainly with respect to constraints**

Current research

(1) Consider pool, metric and matching 'as one'

(2) Treat direct and indirect marriage separately

(3) Multiple re-runs of base year simulation

(4) Use observed partner pool as starting point

(5) Identify vars. most senstive to change upon partnership

(6) Broader range of efficacy measures

(7) Sensitivity testing for over-fitting

Pool selection	Pairing metric	Pair matching
Male rates + top up/down	Age difference	Stable (and variants)
Random	Age + Education	Stochastic (and variants) including size of pool + normalising
N or N x 2 grooms	Age + Education + Children	Tournament (and variants)
ALL men	Best possible	ODD