# 1. DRP Pairing Model

$$max \;\; w_1 \sum_{i\in A}\sum_{j\in B} s_{ij}x_{ij} + w_2 \sum_{i\in A^+}\sum_{j\in B^+} x_{ij} + \; w_3 \sum_{i\in A}\sum_{j\in B} r_i x_{ij} \tag{1}$$

$$1 \le \sum_{i\in A} x_{ij} \le 2, \quad j \in B \tag{2}$$

$$\sum_{j\in B} x_{ij} \le 1, \quad i \in A \tag{3}$$

$$\sum_{i\in A_u}\sum_{j\in B} x_{ij} \le m_u, \quad u \in U \tag{4}$$

$$x_{ij} \le s_{ij}, \quad i \in A, \;\; j \in B \tag{5}$$

$$\sum_{i\in A}\sum_{j\in B} g_i x_{ij} \ge (1-\epsilon)\sum_{i\in A}\sum_{j\in B} x_{ij} \tag{6}$$

$$r_i x_{ij} \ge r x_{ij}, \quad i \in A, \;\; j \in B \tag{7}$$

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$\boldsymbol{x_{ij}} \in \{0,1\}$ assigns mentee $i$ to mentor $j$

$\boldsymbol{A}$: set of mentees
$\boldsymbol{A_u}$: set of mentees from university $u$
$\boldsymbol{A^-, A^+}$: sets of mentees at low and high levels, resp.

$\boldsymbol{B}$: set of mentors
$\boldsymbol{B^-, B^+}$: sets of mentors at low and high levels, resp.
$\boldsymbol{C}$: set of study areas
$\boldsymbol{U}$: set of universities

$\boldsymbol{w_1, w_2, w_3}$: weights
$\boldsymbol{m_u}$: max # of assigned mentees from university $u$.
$\boldsymbol{g_i} \in \{0,1\}$: gender of mentee $i$. women = 1.
$\boldsymbol{\epsilon} \in [0,1]$: parameter for gender equity
$\boldsymbol{r_i}$: reference score of mentee $i$. Input.
$\boldsymbol{r}$: min reference score requirement. Input.
$\boldsymbol{s_{ij}}$: matching score of mentee $i$ with mentor $j$. Input.

$s_{ij} = 0 \iff i, j$ do not share a common interest.

$s_{ij} = \sum_{t\le 3}\sum_{k\le 3} a_{tk} \iff t$.th interest of $i$ and $k$.th interest of $j$ are the same. $a_{tk}$'s are pre-defined values.

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### Constraints

(1) maximizes sum of matching scores.
(2) each mentor receives one or two mentees.
(3) each mentee is assigned to at most one mentor.
(4) at most $m_u$ mentees are assigned from uni $u$.
(5) $i$ is assigned to $j$ only if their interests intersect.
(6) controls the rate of women mentees by $\epsilon$
(7) eliminates mentees with ref score below $r$

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### Notes

**1.** The second term in (1) prioritizes implicitly the assignment of mentees of high levels besides the matching of mentees of high levels and mentors.

**2.** "Bogazici maximum ogrenci sayisini belirlerken calisma alanlari da onemli. Ornek: Bogazici'ni esledikten sonra geriye topoloji calisabilecegimiz mentorler kalsin." **Bunun icin bir constraint tasarlamadik ama model implicitly hallediyor.**