Multi-Objective Optimization Model

Sets:

$$
\begin{aligned}
&T : \text{Teams},\\
&P : \text{Projects},\\
&S : \text{Sprints},\\
&B : \text{Sprint Backlogs},\\
&E : \text{Employees},\\
&F : \text{Features},\\
&R : \text{Release Plans}.
\end{aligned}
$$

Decision Variables:

$$
\begin{aligned}
x_t \in Z, \quad & 3 \leq x_t \leq 9 \quad \forall t \in T,\\
n_p \in Z, \quad & 1 \leq n_p \leq 20 \quad \forall p \in P,\\
\delta_s \in Z, \quad & 7 \leq \delta_s \leq 30 \quad \forall s \in S,\\
f_s \in Z, \quad & 0 \leq f_s \leq 10 \quad \forall s \in S,\\
sp_b \in Z, \quad & 0 \leq sp_b \leq 50 \quad \forall b \in B,\\
e_{e,p} \in \{0,1\} \quad & \forall e \in E, p \in P,\\
b_{p,s} \geq 0 \quad & \forall p \in P, s \in S,\\
t_{e,s} \in Z, \quad & 0 \leq t_{e,s} \leq 20 \quad \forall e \in E, s \in S,\\
r_r \in Z, \quad & 1 \leq r_r \leq 100 \quad \forall r \in R,\\
u_{f,r} \in \{0,1\} \quad & \forall f \in F, r \in R.
\end{aligned}
$$

Objective Functions:

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\begin{aligned}
\max \quad f_1 &= \frac{1}{|S|} \sum_{b \in B} sp_b, \\
\min \quad f_2 &= \sum_{s \in S} d_s, \\
\max \quad f_3 &= \frac{1}{|\text{Reviews}|} \sum_{\text{reviews}} sat, \\
\min \quad f_4 &= \sum_{p \in P} n_p, \\
\max \quad f_5 &= \frac{\sum_{f \in F} \sum_{r \in R} u_{f,r}}{\sum_{p \in P} Budget_p}, \\
\min \quad f_6 &= \sum_{e \in E} \sum_{s \in S} idle_{e,s}, \\
\max \quad f_7 &= \sum_{t \in T} \sum_{s \in S} completed\_tasks_{t,s}, \\
\min \quad f_8 &= \sum_{s \in S} \big(\text{tasks}_s - \sum_{e \in E} t_{e,s}\big), \\
\max \quad f_9 &= \sum_{f \in F} \sum_{r \in R} u_{f,r}, \\
\min \quad f_{10} &= \sum_{p \in P} \big|Spent_p - Budget_p\big|.
\end{aligned}
$$

Constraints (Conditions):

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\begin{aligned}
x_t &\leq 9 && \forall t \in T, && (C1) \\
x_t &\geq 3 && \forall t \in T, && (C2) \\
A_e &\geq 0.5 && \forall e \in E, && (C3) \\
\delta_s &\leq 14 && \forall s \in S, && (C4) \\
b_{p,s} &\leq \frac{Budget_p}{n_p} && \forall p \in P, s \in S, && (C5) \\
\sum_{e \in E_{PO}} e_{e,p} &\geq 1 && \forall p \in P, && (C6) \\
\sum_{e \in E_{SM}} m_{e,t} &\geq 1 && \forall t \in T, && (C7) \\
age_b &\leq 7 && \forall b \in B, && (C8) \\
u_{f,r} \cdot priority_f &\geq 3 && \forall f \in F, r \in R, && (C9) \\
t_{e,s} &\leq 20 && \forall e \in E, s \in S. && (C10)
\end{aligned}
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