



Scheduling of Sports in Dodge

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Background

- Dodge Fitness Center is open 6AM - 12AM daily
- Levien Gym is used for varsity and intramural sports, Blue Gym is used for PE classes and club sports
- Both gyms are open for recreational use when spaces aren't booked



Agenda

- Problem Setup: Determining a feasible schedule for sports teams and classes to use Dodge
- Objective: Schedule sports teams and classes in such a way that ensures 12 hours of idle time each day.
- Two Algorithms: *Interval Scheduling with a Greedy Algorithm* and *Local Search*.
- Final Conclusions



Data

Levien Gym

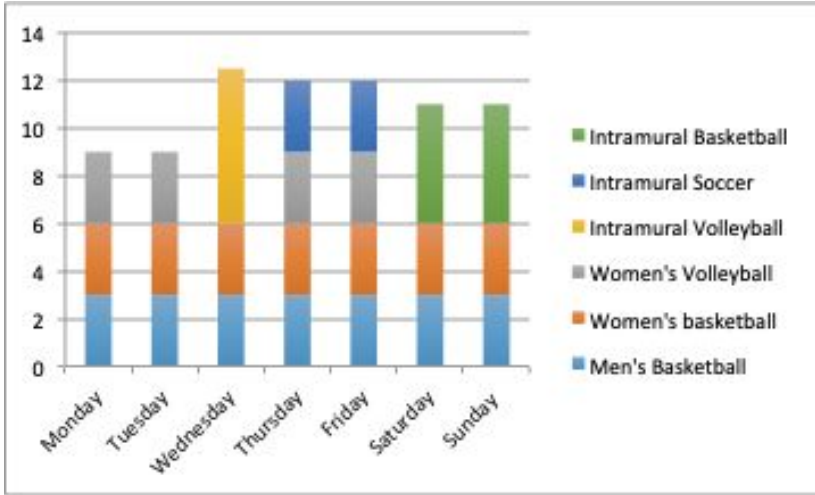
Team	Days per Week	Hours per Day
Women's Basketball	MTWRFSS	3
Men's Basketball	MTWRFSS	3
Women's Volleyball	MTRF	3
Intramural Volleyball	W	6.5
Intramural Soccer	R,F	3
Intramural Basketball	S,S	5

Blue Gym

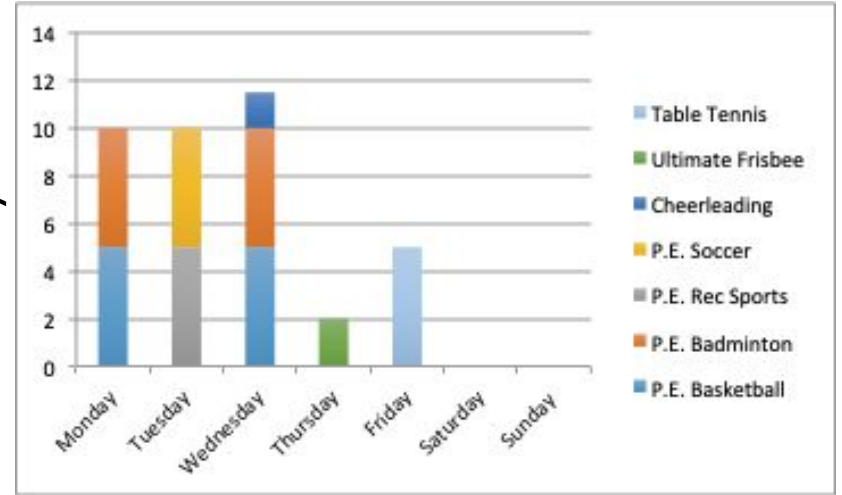
Team	Days	Hours per Day
P.E Basketball	M,W	5
P.E Badminton	M,W	5
P.E Rec Sports	T,R	5
P.E Soccer	T,R	5
Cheerleading	W	1.5
Ultimate Frisbee	R	2
Table Tennis	F	5

Visual Representation

Levien Gym



Blue Gym





Interval Scheduling: Greedy Algorithm

- Input: A set of intervals represented by pairs of points, $\{s_j, f_j\}$
- Output: The largest set of intervals such that none overlap

Greedy Algorithm

Select intervals one after another using the rule of shortest interval, in ascending order of $f_j - s_j$

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
6AM - 9AM	Women's BBall	Women's BBall	Women's BBall	Women's BBall	Women's BBall	Women's BBall	Women's BBall
9AM - 12PM	Men's BBall	Men's BBall	Men's BBall	Men's BBall	Men's BBall	Men's BBall	Men's BBall
12PM - 3PM	Women's VBall	Women's VBall	Intramural VB	Women's VBall	Women's VBall	Intramural Basketball	Intramural Basketball
3PM - 6PM	FREE	FREE	Intramural VB	Intramural Soccer	Intramural Soccer	Intramural Basketball (5-5:30) then FREE	Intramural Basketball (5-5:30) then FREE
6PM - 9PM	FREE	FREE	Intramural VB (6-6:30) then FREE	FREE	FREE	FREE	FREE
9PM - 12AM	FREE	FREE	FREE	FREE	FREE	FREE	FREE
Total Idle	9 HRS	9 HRS	5.5 HRS	6 HRS	6 HRS	7 HRS	7 HRS

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
6AM - 7AM	PE Basketball	PE Rec Games	PE Basketball	PE Basketball	Table Tennis	FREE	FREE
7AM - 8AM	PE Basketball	PE Rec Games	PE Basketball	PE Basketball	Table Tennis	FREE	FREE
8AM - 9AM	PE Basketball	PE Rec Games	PE Basketball	PE Basketball	Table Tennis	FREE	FREE
9AM - 10AM	PE Basketball	PE Rec Games	PE Basketball	PE Basketball	Table Tennis	FREE	FREE
10AM - 11AM	PE Basketball	PE Rec Games	PE Basketball	PE Basketball	Table Tennis	FREE	FREE
11AM - 12PM	PE Badminton	PE Soccer	PE Badminton	PE Badminton	FREE	FREE	FREE
12PM - 1PM	PE Badminton	PE Soccer	PE Badminton	PE Badminton	FREE	FREE	FREE
1PM - 2PM	PE Badminton	PE Soccer	PE Badminton	PE Badminton	FREE	FREE	FREE
2PM - 3PM	PE Badminton	PE Soccer	PE Badminton	PE Badminton	FREE	FREE	FREE
3PM - 4PM	PE Badminton	PE Soccer	PE Badminton	PE Badminton	FREE	FREE	FREE
4PM - 5PM	FREE	FREE	Cheerleading	Women's Ultimate Frisbee	FREE	FREE	FREE
5PM - 6PM	FREE	FREE	Cheerleading (5-5:30) then FREE	Women's Ultimate Frisbee	FREE	FREE	FREE
6PM - 12AM	FREE	FREE	FREE	FREE	FREE	FREE	FREE
Total Idle	8 HRS	8 HRS	6.5 HRS	6 HRS	13 HRS	18 HRS	18 HRS



Local Search: Progress

- Had difficulties implementing algorithm due to equal processing times across all Varsity sports and PE classes
- Not many iterations are possible due to similar nature across tasks
- Ultimately, local search came to the same conclusion as our greedy algorithm



Final Conclusions

- Interval scheduling greedy algorithm may not be practical for real-life applications
 - For example, most would not sign up for a 6 AM P.E class
 - However, produces uninterrupted idle time
- As schedule density increases, the quality of the schedule produced would likely deteriorate
- Larger data set would have provided a larger solution space