Dermatology Residency Scheduling Tool
Riley McKeown, Justin Rogers, Muhammed Ugur, William Pozehl MSE, Amy Cohn PhD, Emilie Dore MD

Problem Statement
Background
The Dermatology Residency Program at the University of Michigan requires each resident to be assigned to a specific activity each weekday during the morning and afternoon, within a month-long planning horizon. Each activity must meet staffing requirements, and the residents must adhere to educational requirements.

Traditional Approach
Chief residents typically create monthly schedules by hand. Due to the numerous rules chiefs must abide by, the process of building a feasible schedule is nearly impossible.

Challenges
- Chief residents spend valuable time creating schedules rather than focusing on patient care.
- Residents are given insufficient jeopardy time to balance their clinical duties.
- Residents are often required to travel between clinical sites, which wastes time finding parking, and can cause missing lunch.

Research Goals
- Work with chief residents to determine the scheduling rules and quality metrics.
- Formulate a mathematical model, and build a computerized tool which rapidly generates high-quality schedules.

Solution Approach

Feasible Schedule
A valid schedule that meets all of the hard requirements given by the Dermatology chief residents.

High-Quality Schedule
High-quality schedules limit the number of undesirable characteristics, such as intra-day travel and shortages of jeopardy time.

Formulate mathematical model
Encode in C++ using CPLEX
Load monthly input files
Solve for a high quality schedule
Review schedule and metrics

Decisions
Do we assign resident \( r \) to activity \( a \) on date \( d \) during shift type \( s \)?

Rules
All of the rules, modeled as constraints, must be satisfied for a schedule to be feasible.

Clinic Staffing Requirements
Resident Assignments
Special Pre-assignments
Activity Pairing Prohibitions
Resident Prohibitions
Activity Pairings

Metrics
After obtaining a feasible schedule, we incorporate metrics to find a high-quality schedule. Since optimizing one metric may result in other metrics being suboptimal, we work with the chief residents to determine an acceptable balance.

- Activity Pairing Prohibitions
- Resident Prohibitions
- Activity Pairings

Data Tracking
The tool enables the chief residents to track metric data on a monthly basis.

Impact/Results
Rapidly-Generated, High-Quality Schedules
Less Time Required By Chief Residents to Create Schedules
Increased Patient Experience

Sample Output
The schedule reports are easier to interpret than the old documentation.

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<th>Name</th>
<th>Time</th>
<th>3-Sep</th>
<th>4-Sep</th>
<th>5-Sep</th>
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<th>7-Sep</th>
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</tbody>
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