Problem Statement

Dermatology residents must be assigned to daily half-day activities (specific clinics, administrative time, etc.), subject to various rules, guidelines, and metrics.

Specifically, the goal is to determine which activity to assign each resident on each workday in the morning and in the afternoon over the course of a month.

Solution Approach

Formulate
A linear programming model using Boolean decision variables

Encode
Written in C++ using CPLEX implemented with Visual Studio

Load
Input files are created each month with schedule requirements

Solve
Software solves model to optimality

Review
Schedule and metrics reported to be reviewed by chief residents

Boolean Decision Variables
Do we assign resident \( r \) to activity \( a \) on date \( d \) in the morning?
Do we assign resident \( r \) to activity \( a \) on date \( d \) in the afternoon?

Constraints
Various hard requirements must be met in order to produce a feasible schedule. For example, each resident must be assigned to an activity every morning and afternoon, and each clinic has coverage requirements.

Metrics
We incorporate various means to measure the quality of different feasible schedules. These metrics should be optimized, however optimizing one metric may result in other metrics being suboptimal. We work with the chief residents to determine an acceptable balance.

Impact/Results

In a matter of seconds, the computer model produces a schedule of higher quality than a human could produce over many hours or even days.

This tool frees the chef residents to focus on more important tasks related to caring for patients.

Making updates to an initial schedule takes the computer only seconds, meaning changes are relatively easy to implement.

Ongoing Work

Implement functionality to modify existing schedules with new requirements, applying minimal changes.

Implement new infrastructure to more efficiently handle clinic shutdowns and other unforeseen requirements.

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