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A Tactical Transportation-Driven Harvest Planning Problem

We present here a problem that arises in the Canadian forestry industry in tactical (annual) planning. Given a set of mill demands of multiple log assortments over this planning horizon and a forest management area of multiple sites available for harvest, the decisions commonly made at this level of planning are the schedules of harvest teams, storage decisions, and the allocation each month of volume from forest to mill while minimizing storage and transportation costs.

However, a critical component of operations of Canadian forestry companies is to guarantee a variety of different driver schedules to their trucking contractors throughout the year in order to ensure that they have a reliable source of permanent drivers, and we generalize the problem to take this into account as routing decisions. Additionally, the heterogeneity of the truck fleet necessitates further decisions to be made in harvest planning in the form of the length of cut timber.

This problem is modeled as a mixed integer program, with the objective function set to minimize storage and transportation costs, while also maximizing the workload of higher priority harvest teams and trucking contractors. This facilitates the use of a branch-and-price heuristic to solve the problem with columns, representing daily driver shifts, generated via a shortest path problem with resource contraints. Results are given on several case studies provided by industrial partners.