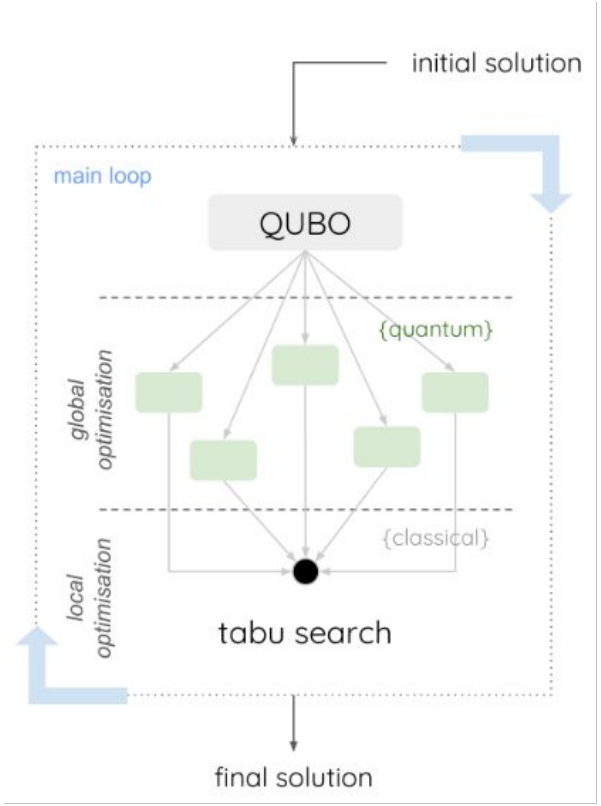
Quantum Computing Meeting

13.06.2022

Qubo Splitting Studies: Impact list approach



Impact list approach:

Sort triplets per impact they have on the overall hamiltonian.

Assumption: triplets can be distinguished by impact

Impact List: what happens if impacts are the same?

Same impact triplets are sorted at random (np.argsort)

Randomness was less limiting for DWAVE since subqubos bigger

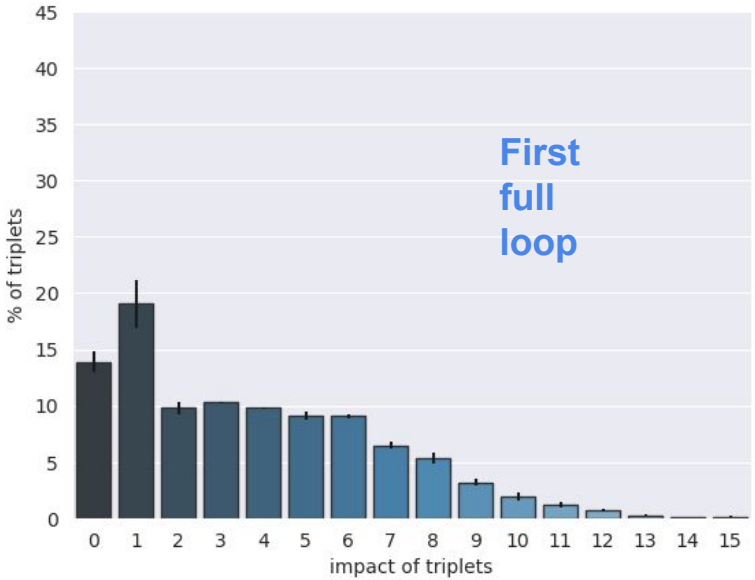
Considered here: simplest preselection (e1gpc, 5.0xi, 500HEP)

- a_i = 0 (quality)
- B_ij = 1 (conflict) or
- B_ij = -1 (track)

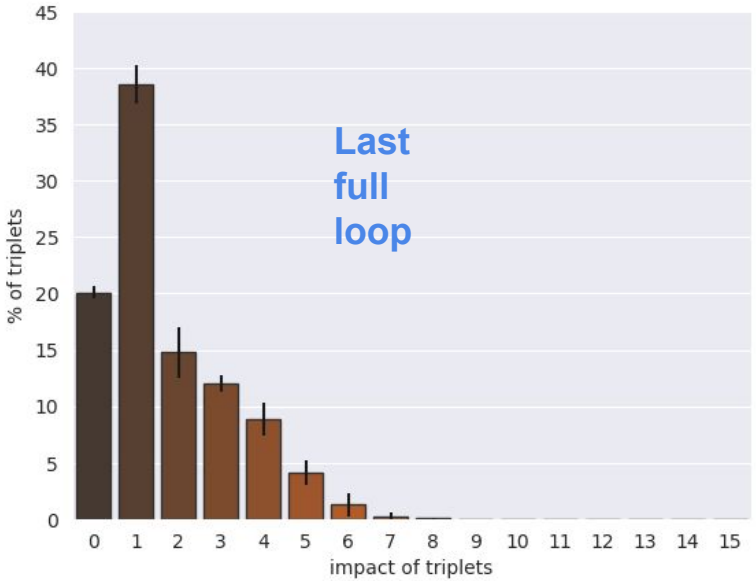
Impact List: Bunches grow while approaching minimum

The closer we approach the minimum, the lower-impact bunches grow in size

→The further we advance to the minimum, the less we can rely on the impact algorithm?

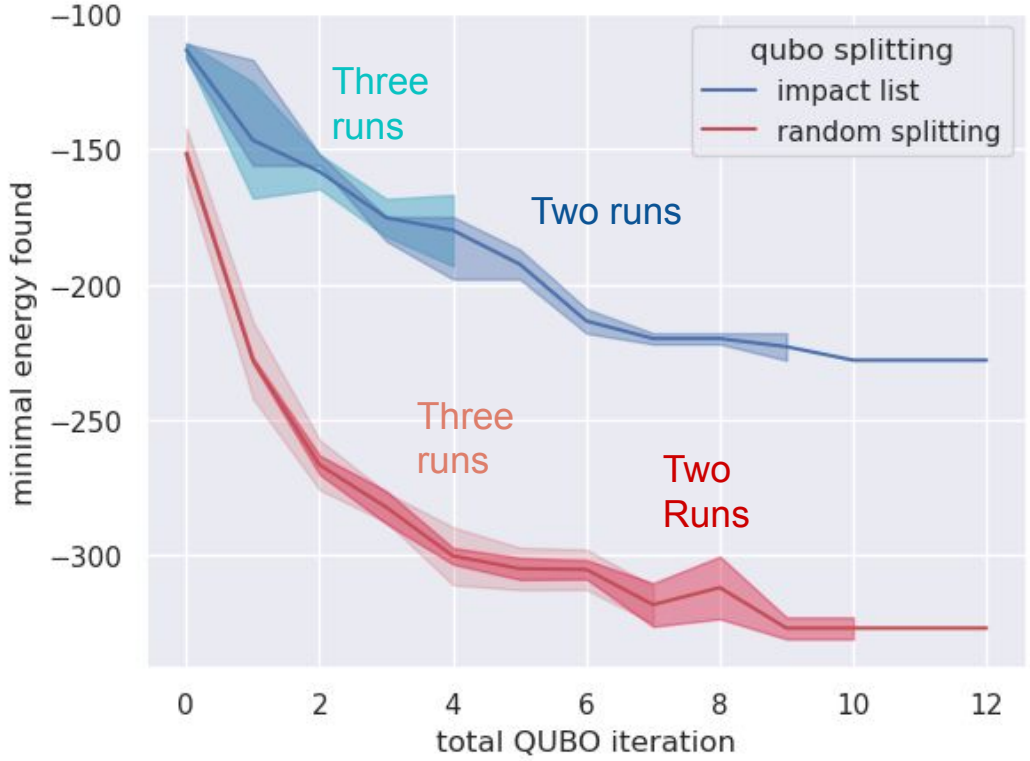


Average:
3 runs



Random splitting find lower ground state

Constant setting: a_i=0, b_ij=-1 or 1



Three runs considered:

Run stops after minimum did not change for four iterations
→ different run lengths

Plot has not converged yet!

Qubo splitting: problems and suggestions

Impact list is usable approach if impacts of individual triplets differ → definition of quality and interaction terms also crucial for impact lists to work

Dependent on Impact:

- Impact List
  - What if subsets are again sorted at random? → see if similar to argsort sorting
  - Does argsort sorting depend on position/index?
  - How well does impact-list perform if b_ij's angle dependent?
- Connectivity approach

Not dependent on Impact:

- Random sorting
- Spatial approach
  - Different ways of dividing subset