

Triplets and paths summary

April 12, 2019

1 Introduction

This section describes the structure of the experiments involving *triplets* and *3bit paths* for generating bracket pools.

Definition 1 *Let a triplet be the set of three games between four teams a, b, c, d such that games a -vs- b and c -vs- d take place in the same round and the third game in the triplet corresponds to the match-up in the next round between the winners of these two games.*

Definition 2 *Let a regional triplet be a triplet where all three games take place between teams in the same region. Complementarily, let a non-regional triplet be a triplet where at least one of the match-ups include teams from different regions.*

Definition 3 *Let a 3bit path be a set containing the outcomes of three games that take place in three consecutive rounds $(j, j + 1, j + 2)$ such that one of the teams in for the match-up in round j can potentially advance to round $j + 2$.*

Definition 4 *Let a regional path be a 3bit path where all games take place within a region, that is, $j \leq 2$, and let a non-regional path to be any other valid 3bit path.*

Definition 5 *A bitwise MLE bracket generator is a model where the outcome of the i -th match-up is determined according to the fraction of times the i -th bit of the 63-bit vector representation of a bracket for the modern-era tournaments is a 1.*

There are seven different regional triplets (i) four regional triplets where the first two games take place in the first round — hereafter referred to as $R1_R2_i$ for $i = 1, 2, 3, 4$, (ii) two regional triplets where the first two games occur in the second round — hereafter referred to as $S16_E8_1$ and $S16_E8_2$, and (iii) one regional triplet where the first two games occur in the third round and which last game is the region championship game, namely, $E8_F4$. Figure 1 highlights some of the triplets for each of these cases.

Additionally, each region contains 12 regional paths. Eight of them that starts with each of the first round match-ups — namely, P_S1, P_S2, \dots, P_S8 , where P_Si corresponds to the path that starts with the match-up between seed i and $17 - i$ — and four regional paths that start in the second round — namely, P_R2_i for $i = 1, 2, 3, 4$. Figure 2 identifies some of these paths.

A whole bracket consists of four of these regional brackets, each of which crowns a champion. These four teams are commonly known as the *Final Four* and take place in the final 3 games leading to the National Championship game. In this whole bracket, three non-regional triplets can be identified, as shown in Figure 3.

Finally, this whole bracket also contains 12 non-regional paths: eight that start in the third round, namely, $P_R3_R5_i$, for $i = 1, 2, \dots, 8$; and four paths that start in the fourth round and reach the national championship game, namely, $P_R4_R6_i$, for $i = 1, 2, 3, 4$. Some of these paths are shown in Figures 4 and 5.

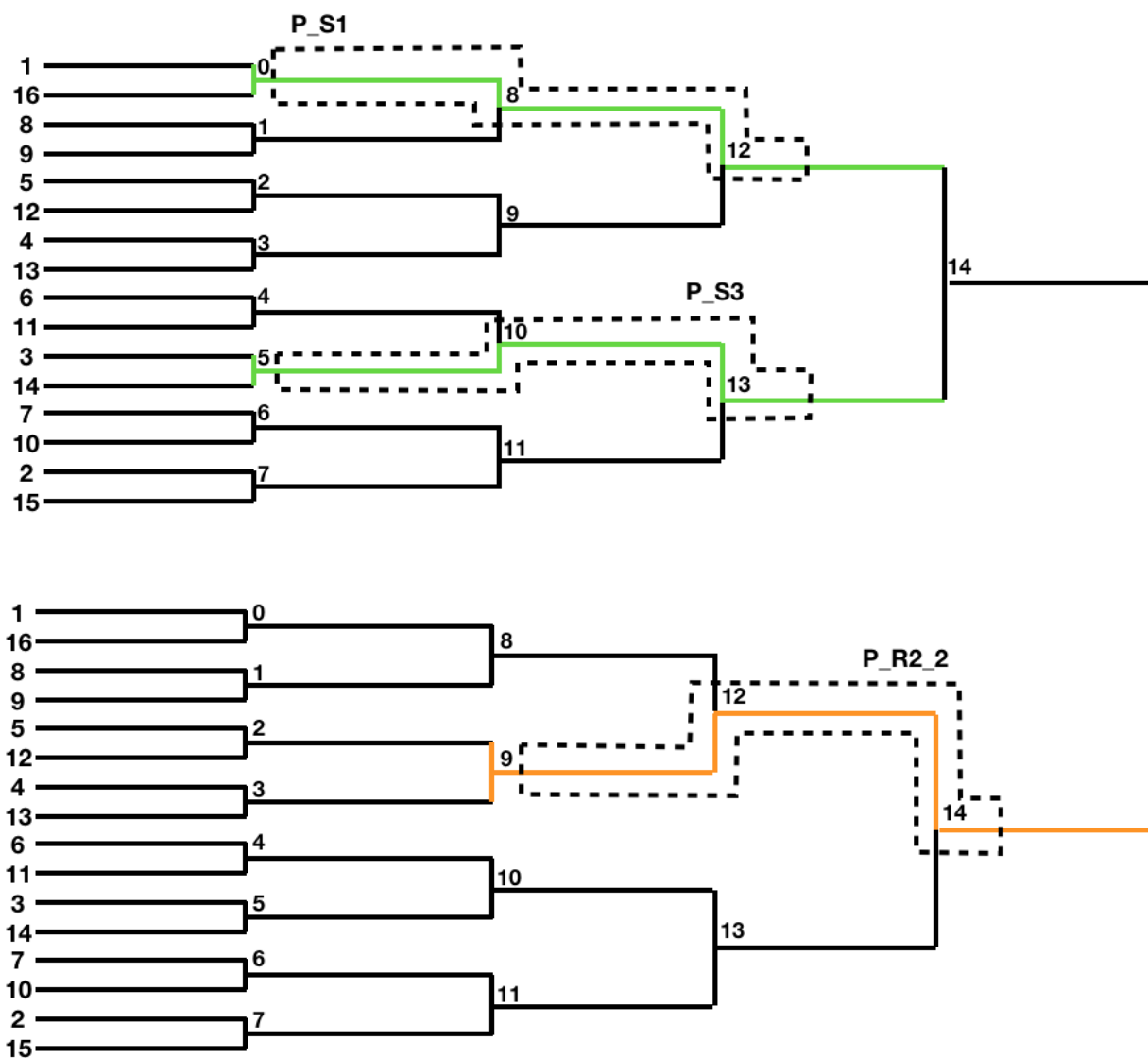


Figure 2: Identification of regional paths.

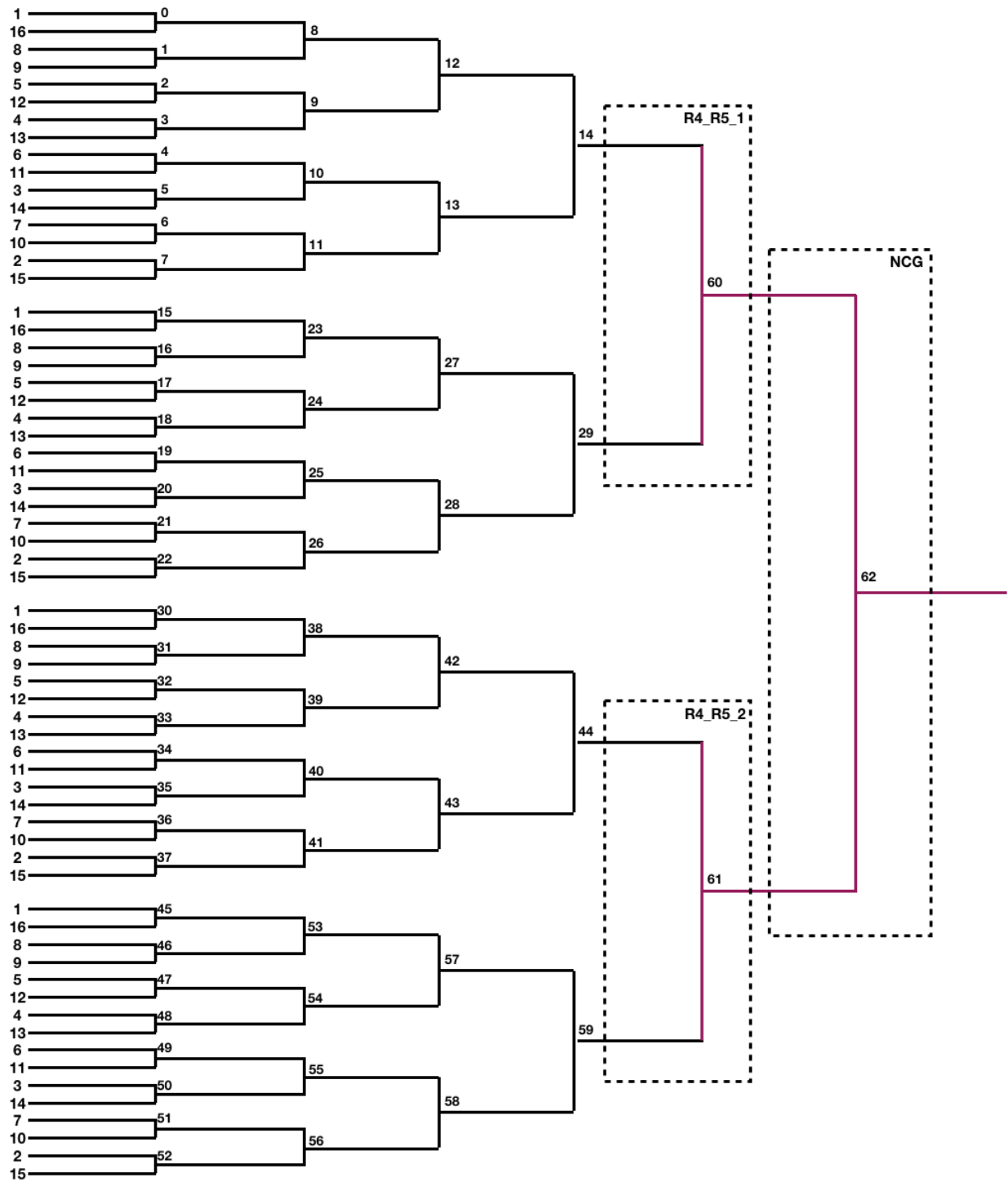


Figure 3: Identification of non-regional triplets.

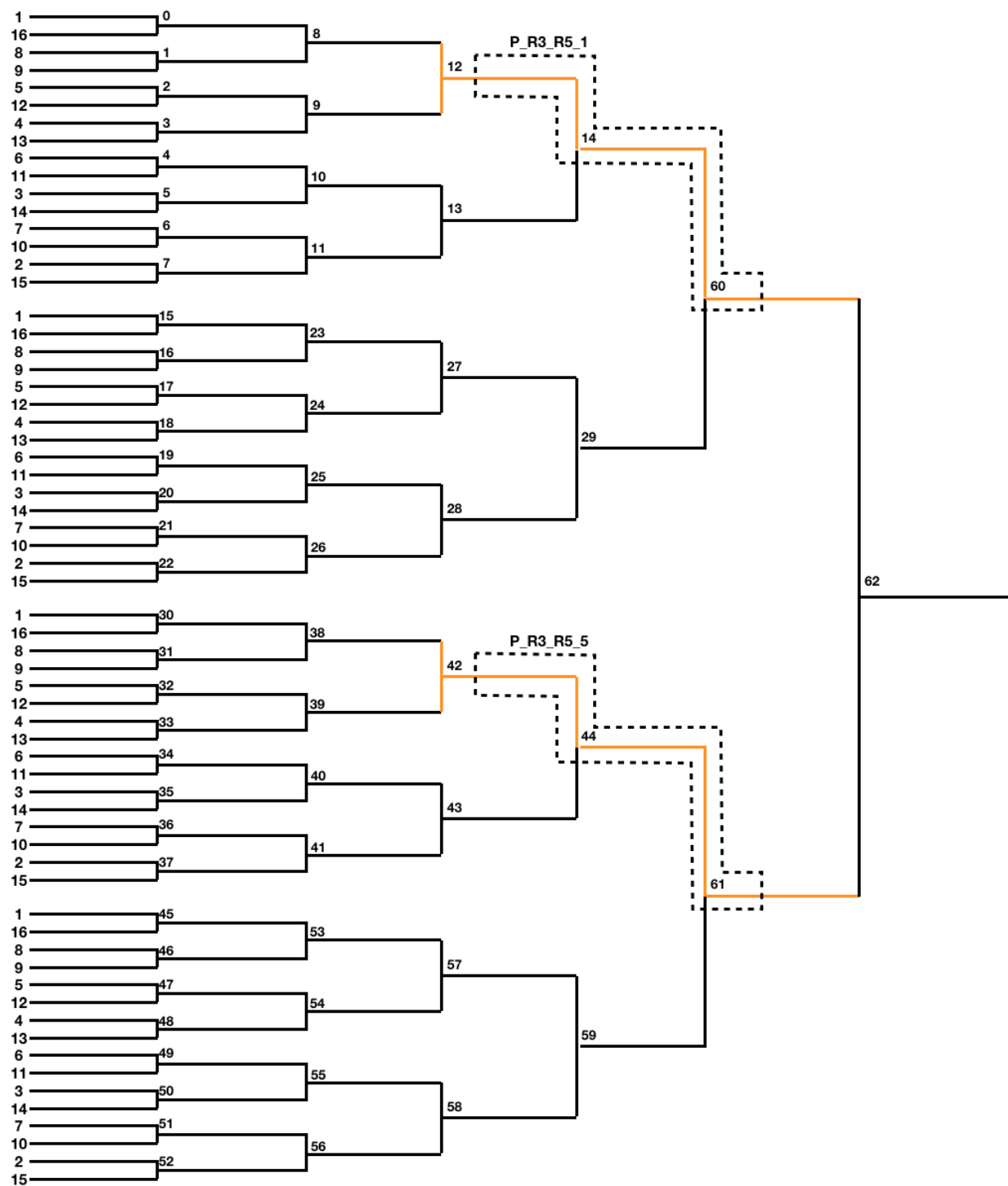


Figure 4: Non-regional paths starting in the third round of the tournament.

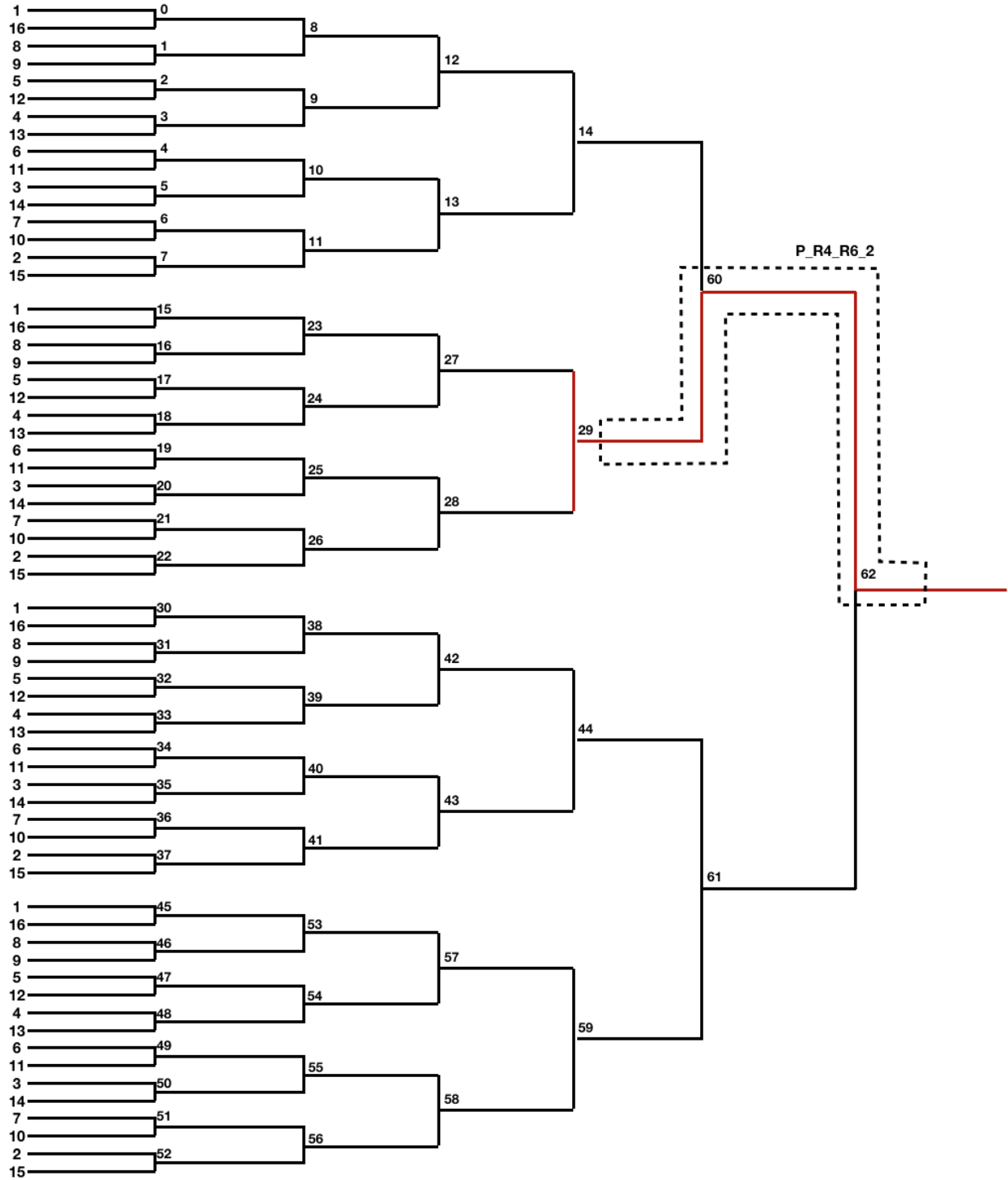


Figure 5: Non-regional paths starting in the fourth round of the tournament.