

CFOP 分阶段学习教程

三叶虫

步骤介绍

CFOP 法共分四步：

- (1) 在底层架好十字(CROSS)
- (2) 完成前两层(F2L,41 个基本情况)
- (3) 顶面颜色统一(OLL,57 个基本情况)
- (4) 完成顶层(PLL,21 个基本情况)

公式说明

- (1) 顺时针用字母表示，如 U 表示上层顺时针旋转 90 度。
 - (2) 逆时针用一撇表示，如 U' 表示上层逆时针旋转 90 度。
 - (3) 180 度用 2 来表示，如 U2 表示上层顺时针旋转 180 度，U'2 表示上层逆时针旋转 180 度。
 - (4) 相应的小写字母 f、b、l、r、u、d 代表转动两层。
 - (5) x(整个魔方以 R 的方向转动)，y(整个魔方以 U 的方向转动)，z(整个魔方以 F 的方向转动)。
- 注：顺、逆指面对该面看时的转向，故对于 B、B'、L、L'、D、D' 的转向要特别小心。

基本公式有 $41+57+21=119$ 个，刚开始学的朋友不可能一次学完，可以按照一定的步骤分阶段学习。

第一阶段 CROSS+3+(1+2)+(2+2)

CROSS 首先掌握基本的做出 CROSS 的方法

4 个棱块复位后是这样的

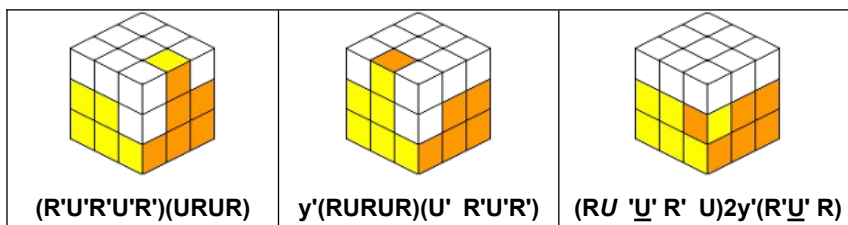


不要是这样



然后 在此基础上完成第一层(还差 4 个角)

F2L 先掌握三个公式

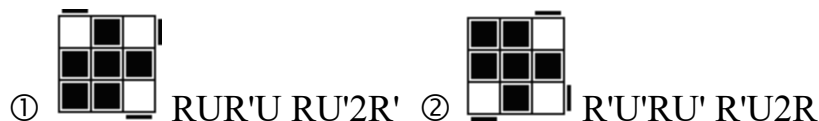


OLL 分两步做(顶面出“+”字, 顶面颜色统一)

OLL-1 只背 1 个公式 $F RUR'U' F'$



OLL-2 先背 2 个公式(总共处理 7 种情况)

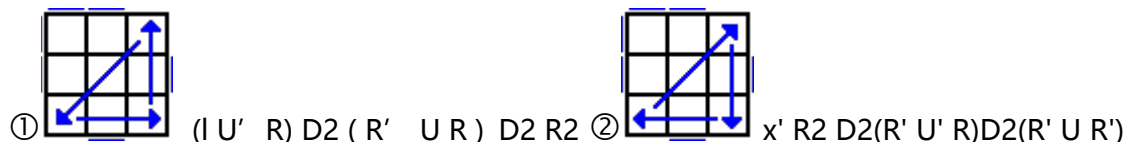


遇到其他 5 种情况时 先用 $RUR'U RU'2R'$

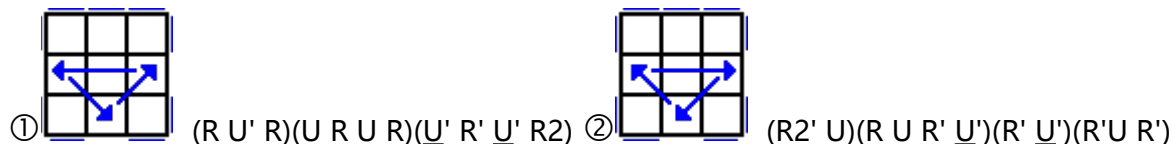


PLL 分两步(角块归位, 棱块归位)

PLL-1 2 个公式(总共处理 3 种情况)



PLL-2 2 个公式(总共处理 4 种情况)

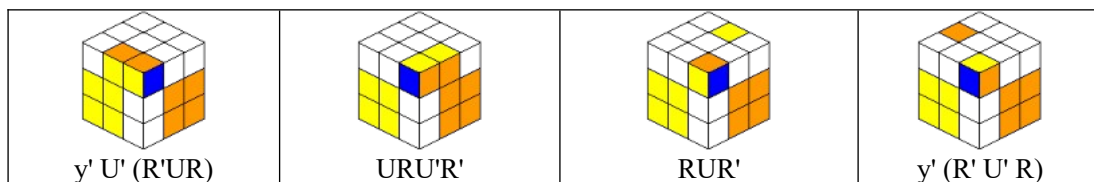


第一阶段的公式足以还原魔方

第二阶段 CROSS+(3+?)+(3+7)+(3+4)

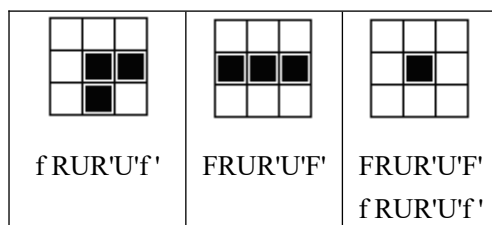
CROSS 不多作要求，快速完成第一层

F2L 在第一阶段的基础上，逐步理解 F2L，掌握几种简单的情况

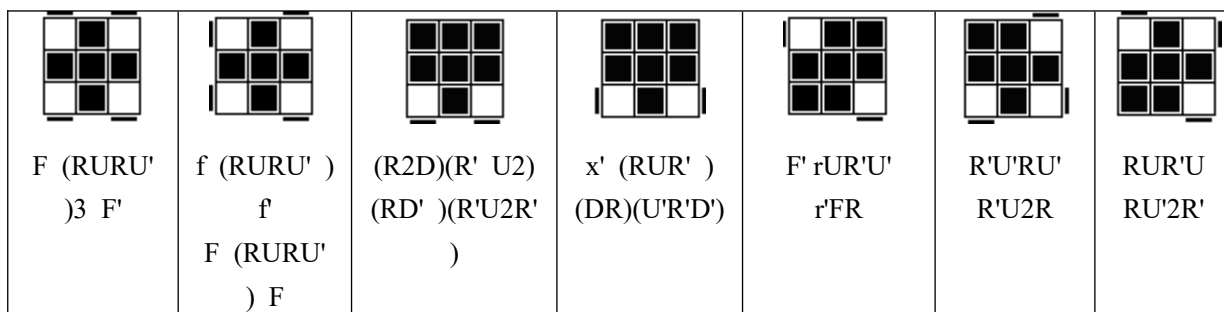


OLL 仍然分两步做(顶面出“+”字，顶面颜色统一)

OLL-1 3 个公式

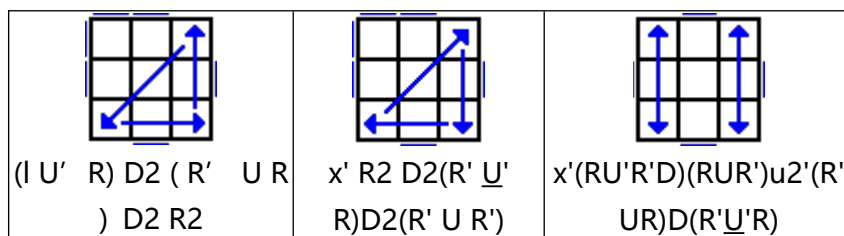


OLL-2 7 个公式

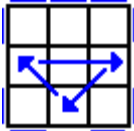
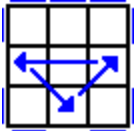
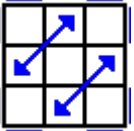
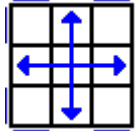


PLL 仍然分两步(角块归位,棱块归位)

PLL-1 3 个公式(多加的公式是这个阶段**必须掌握**的！)



PLL-2 4 个公式(多加的公式是这个阶段**必须掌握**的！)

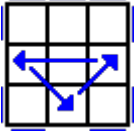
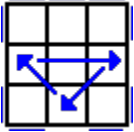
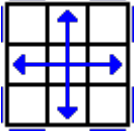
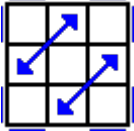
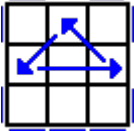
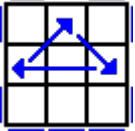
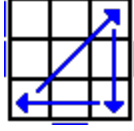
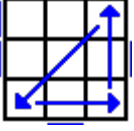
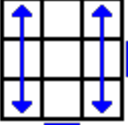
 $(R^2 \ U)(R \ U \ R' \ \underline{U}')(R' \ \underline{U}')(R' \ U \ R')$	 $(R \ U' \ R)(U \ R \ U \ R)(\underline{U}' \ R' \ \underline{U}' \ R^2)$	 $U(R'U'R U')(RUR) \ U'R' \ URUR^2 \ U'R'U$	 $M^2 \ U \ M^2 \ U^2 \ M^2 \ U \ M^2$
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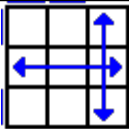
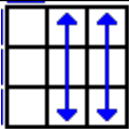
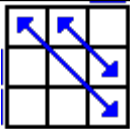
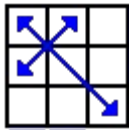
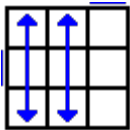
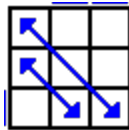
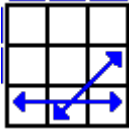
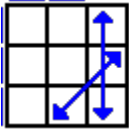
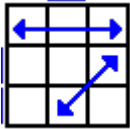
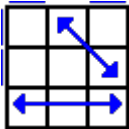
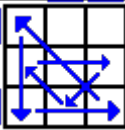
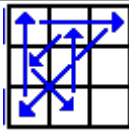
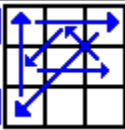
第三阶段 强化 PLL、OLL、F2L、CROSS

PLL 和 OLL 公式，“投资少”，见效快，是初期提速最简便最快捷的方法。

PLL 和 OLL 的学习过程中可以加入手法了(这里的手法指的是像 x y z 的转法和一次转两层)。

PLL 21 个公式

棱换	     	01. $(R \ U' \ R)(U \ R \ U \ R)(\underline{U}' \ R' \ \underline{U}' \ R^2)$ 02. $(R^2 \ U)(R \ U \ R' \ \underline{U}')(R' \ \underline{U}')(R' \ U \ R')$ 03. $M^2 \ U \ M^2 \ U^2 \ M^2 \ U \ M^2$ 04. $(U \ R' \ \underline{U}')(R \ \underline{U}' \ R)(U \ R \ \underline{U}')(R' \ U \ R \ U)(R^2 \ \underline{U}')$ (R'U) 01'. $(R^2 \ U)(R' \ \underline{U}' \ R \ U \ R \ U)(R \ U' \ R)$ 02'. $(R' \ U \ R' \ \underline{U}')(R' \ \underline{U}')(R' \ U)(R \ U \ R^2)$
角换	  	05. $x' \ R^2 \ D^2(R' \ \underline{U}' \ R)D^2(R' \ U \ R')$ 06. $x'(R \ U' \ R)z'(R^2 \ \underline{U}' \ L \ U \ R^2' \ x \ y \ R^2)$ 上式中的 $R^2' \ x \ y$ 是同时进行的 07. $x'(R \ U' \ R' \ D)(R \ U \ R')u^2(R' \ U \ R)D(R' \ \underline{U}'$

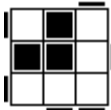
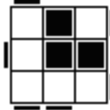
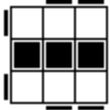
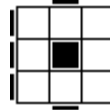
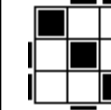
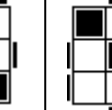
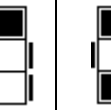
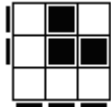
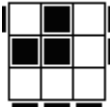
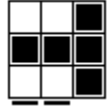
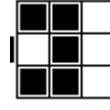
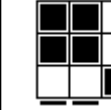
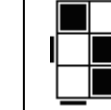
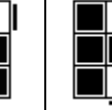
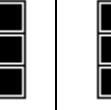
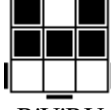
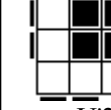
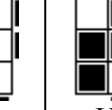
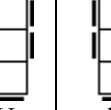
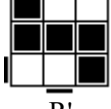
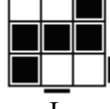
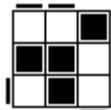
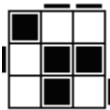
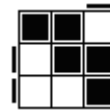
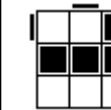
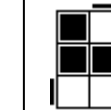
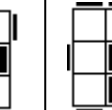
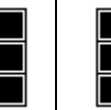
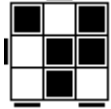
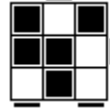
		R)
邻角 对棱 对角 邻棱	     	08. $(R \ U \ R' \ \underline{U}')(R' \ F)(R2 \ \underline{U}' \ R' \ \underline{U}')(R \ U \ R' \ F')$ 09. $\underline{U}'(R'U \ R \ \underline{U}' \ R'2 \ b')x(R'U \ R)y'(R \ U \ R' \ \underline{U}'$ R2) 10. $(R' \ U \ R' \ \underline{U}')y^2(R' \ U \ R' \ \underline{U}'R2)xz'(R'\underline{U}'R \ U$ R) 11. $F(R \ \underline{U}'R' \ \underline{U}')(R \ U \ R' \ F')(R \ U \ R' \ \underline{U}')(R' \ F \ R$ F') 09'. $z(R \ U \ R' \ \underline{U}' \ R \ \underline{U}' \ \underline{U}')(x' \ z')(R \ U \ R' \ \underline{U}')$ $x(\underline{U}'R'U \ R \ \underline{U}' \ \underline{U}')$ 10'. $z(U' \ R \ U' \ I')z(R' \ U \ R'U')(I \ R)$ $(U' \ R' \ U \ R \ U)$
邻角 邻棱 换	   	12. $z(\underline{U}' \ R \ D')(R2 \ U \ R' \ \underline{U}' \ R2 \ U)z'(R \ U')$ 13. $(R \ U \ R'F')(R \ U \ R'\underline{U}')(R'F \ R2 \ \underline{U}'R'U')$ 14. $(R' \ U2)(R \ U'\underline{U}')(R' \ F \ R \ U \ R' \ \underline{U}')(R'F' \ R2$ $\underline{U}')$ 15. $(R \ U'\underline{U}')(R' \ U2)(R \ \mathcal{B}' \ R' \ \underline{U}')(R \ U \ R \ \mathcal{B} \ R2'$ U)
三角 三棱 换	  	16. $(R2' \ \underline{u}' \ R \ U' \ R)(U \ R' \ u)(R2 \ fR' \ f)$ 17. $(R \ U \ R')y'(R2' \ u' \ R \ U')(R' \ U \ R' \ u \ R2)$

		18. $(R^2\ u)(R'\ U\ R'\ \underline{U})(R\ u')(R^2\ \textit{F}\ U\ \textit{F})$ 19. $(R'\ d'\ F)(R^2\ u)(R'\ U)(R\ U'\ R\ \underline{u}'\ R^2)$
对角 对棱 换		20. $z(R'\ U\ R')z'(R\ U^2\ \underline{L}'\ U\ R')$ $z(U\ R')z'(R\ U^2\ \underline{L}'\ U\ R')$ 21. $z(\underline{U}'\ \textit{R}\ D')(R^2\ U\ R'\ \underline{U}')z'(R\ U\ R')$ $z(R^2\ U\ R')z'(R\ U')$
说明	符号系统：RLUDFB, rludfb(转两层) 如 u 就是上两层顺时针转 90 度 x(整个魔方以 R 的方向转动), y(整个魔方以 U 的方向转动), z(整个魔方以 F 的方向转动), 斜体是用右拇指 下划线用左食指	

学习建议：一天背 2 个公式，不要贪多，背就练熟，注意合理分组学习。

OLL 57 个公式

23 $R^2D'\ RU^2$ $R'D\ RU^2R$	21 RU^2 $R'URUR'U'$ $RU'R'$	22 RU^2 $R^2U'\ R^2U'$ $R^2U'^2R$	24 $rUR'U'$ $r'FR\ F'$	25 $F'\ rUR'U'$ $r'FR$	26 $R'UR'U'$ $R'U^2R$	27 $RUR'U$ RU^2R'	
45 F $(RUR'U')$ F'	44 f $(RUR'U')$ f'	43 f' $(L'U'LU)$ f	2 $F(RUR'U')F'$ $f(RUR'U')f'$	3 $f(RUR'U')f$ $'$ U' $F(RUR'U')F$	4 f $'(L'U'LU)f$ U $F'(L'U'LU)$	12 $FRUR'U'F'$ U $FRUR'U'F'$	11 $F'L'U'LUF$ U' $F'L'U'LUF$

48  F (RUR'U')2 F'	47  F' (L'U'LU')2 F	51  f (RUR'U')2 f'	1  RU'2 R'2FRF' U2(R'FRF')	' 17  RUR'U R'FRF'U2 R'FRF'	F 18  F(RUR'd) R'U2 R'FRF'	19  r'(RU)2 R'U'r R'2 FRF'	20  r'(RU)2 (R'U' r2R'2) (URU')r'
49  F'RU'2R'U2 R'F2RF'	50  FL'U2LU'2 LF2L'F	33  RUR'U' R'FRF'	46  R'U' R'FRF' UR	37  F(RU'R'U') RUR'F'	35  RU'2R'2 FRF' RU'2R'	57  RUR'U'r R'URU'r'	28  rUR'U' r'RU RU'R'
34  R'U'R'U y(rUR'U') r'R	52  R'U'R'U' R'd R'URB	55  R U'2R'2 U'RU'R'U2 FRF'	56  F(RUR'U') RF' rUR'U'r'	6  r U'2 R'U'R'U' r'	5  l'U2 LUL'U l'	7  rUR'U RU'2 r'	8  l'U'LU' L'U2 l
40  R' (FRUR'U'F') UR	39  L (F'L'U'LU'F') U'L'	14  R'FRUR' F'R FU'F'	13  LF'L'U'L FL' F'UF	54  rU'2 R'U'RUR'U' RU'r'	53  l'U2 LUL'U'LU L'U l	29  R'FRF' RU'2R'd' L'U'L	30  LF'L'F L'U2Ld RUR'
10  RUR'U R'FRF' RU'2R'	9  L'U'LU' LF'L'F L'U2L	38  RUR'U RU'R'U' R'FRF'	36  L'U'LU' L'ULU LF'L'F	16  rUr' RUR'U' rUr'	15  l' U' l L'U'LU l' U l	32  (RU)(B'U') (R'U RBR')	31  (L'U')(BU) (LU' L'B'L)
41  RU'R'U2 RUyRU' R'U'F'	42  L'ULU'2 L'U'y'L'U LUF						

学习建议：每天都背，不要贪多，背就练熟，任然注意合理分组。

像上面第2行和第3行前3个公式，都是由 F RUR'U' F' 这个基本

公式演化来的。

F2L 41 个基本情况

CROSS 练习尽量少的步骤内(8 步以内)完成

第四阶段 F2L 的四向和非标

四向：尽量在少转动魔方的情况下完成 F2L，这样就要求要完成的一组角和棱放到手的后面完成。

公式可以参考 张砷镓 的 F2L 四向手法教程【三国演义】

非标：非基本情况下的 F2L，利用未完成的空档来快速做 F2L。

公式参考 中岛非标。

注意公式的左右对称，这样可以减少记忆量，并可以锻炼双手。

本人能力有限，只能写到这个地方，更深入的技术还买有学习...

以上给出的全部公式为本人用的公式

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三叶虫

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