

OLL 手法

Gan

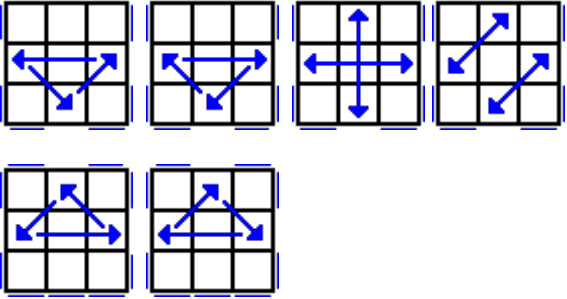
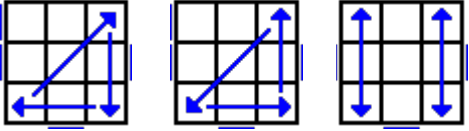
1	2	3	4	5	6	7	8	9	10
(R U' U)	(F R U R'	f(R U R'	f(R U R'	(r' U2)	(r U' U)	r U	r' U' R	(R' U' R)	(R U
(R2' F R F')	U' F')	U')f' U' F(R	U')y x(R'	(R U R' U)	(R' U' R	R' U R	U' R' U2 r	y' x' (R U)	R' U)(R' F
U2	(f R U R' U'	U R' U')F'	F)(R U R'	r	U' r')	U' U' r'		(R' F)	R F')
(R' F R F')	f')		U')F'					(R U R')	(RU' U' R')
11	12	13	14	15	16	17	18	19	20
r'(R2 U R'	(r R'2 U' R	(r U' r'	R' F R U	(r' U' r)	(r U r')	(R U R' U)	F (R U R'	(r' R U)(R	r'(R U)
U)(R U' U'	U')(R' U2 R	U')(r U r')	R' F' R	(R' U' R U)	(R U	(R' F R	d)(R' U2)	U R' U' r)	(R U R' U'
R' U)	U' R)r'	(F' U F)	(F U' F')	(r' U r)	R' U)	F' U2)	(R' F	(R'2 F R	r2)(R2' U)
(r R')					(r U' r')	R' F R F'	R F')	F')	(R U) r'
21	22	23	24	25	26	27	28	29	30
(R U' U)	R U' U'	(R2 D')	(r U R' U)	F(r U	R U' U'	R' U2 R U	(r U R' U)	(r U R' U)	(R2 U R'
(R' U'	(R'2 U)	(R U' U)	(r' F R F)	R' U)	R' U'	R' U R	(r' R U)	(R r'2 F R	B')(RU')
R U R' U)	(R2 U)	(R' D)		(r' F R)	R U' R'		(R U' R')	F')	(R2' U)
(R U' R')	R'2 U' U' R	(R U' U' R)						(r R')	(R B R')

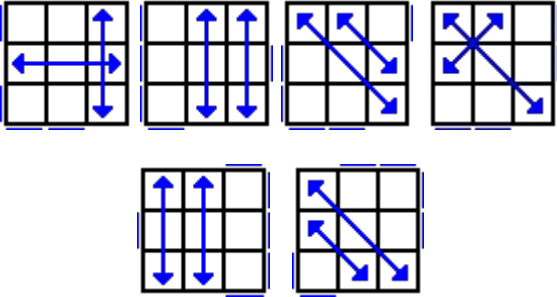
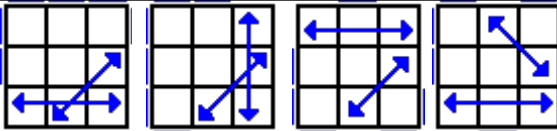
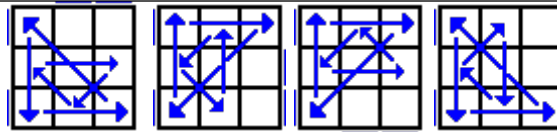
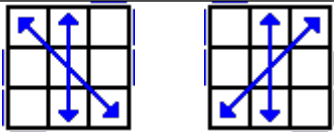
31 (r' F U F) (L F' L' U' r)	32 (R U)(B' U') (R' U R B R')	33 (R U R' U') (R' F R F') f)	34 (R' U' R U) y(r U R' U')r' R	35 R U' U' R2' F R F'(R U' U' R')	36 R' U' R U' R' U R U I U' R' U	37 F (R U' R' U' R U) (R' F')	38 (R U R' U) (R U' R' U') (R' F R F')	39 (r U' r' U' r)y(R U R' f)	40 (R' F R U R' U') (F U R)
41 R U' R' U2 R U y R U' R' U' F'	42 (R2 U' R) F (R' U) (R2 U') (R' F R)	43 (B' U') (R' U R B)	44 f (R U R' U')f'	45 F (R U R' U') F'	46 (R' U') R' F R F' (U R)	47 B'(R' U' R U)2 B	48 F (R U R' U')2 F'	49 R B'(R2 F) (R2 B) R2 F' R	50 L'B (L2 F') (L2 B') L2 F L'
51 f (R U R' U')2 f'	52 R' U' R U' R' d R' U I U	53 (r' U2) (R U R' U') (R U R' U) r	54 (r U' U') (R' U' R U R' U') (R U' r')	55 (R U' U') (R'2 U') R U' R' U2 (F R F')	56 F (R U R' U')(R F')(r U R' U')r'	57 (R U R' U' r)(R' U) (R U' r')			
29' (r' R2)y (R U R' U') (R' U R')r	47' b' U' (R' U R U' R' U R)b	10' (L U L') y' (R' F R F')	5' (l' U2) (L U L' U I) I'	6' I U2 L' U' L U' I'	3' (r' R2 U R' U)(r U2)(r' U	12' F (R U R' U') y L' F (R U R'	13' I U' R' F' R U I' y R' U R		

		(R U2 R')			r R')	U') F'			
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PLL 手法

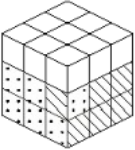
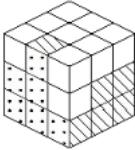
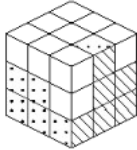
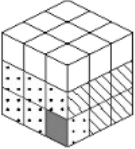
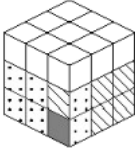
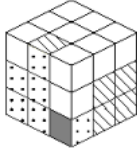
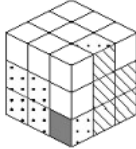
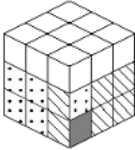
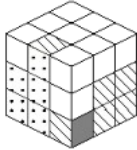
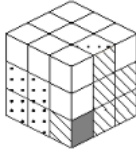
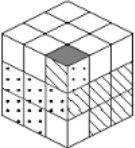
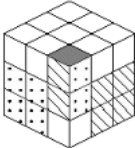
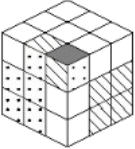
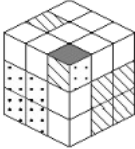
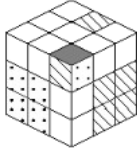
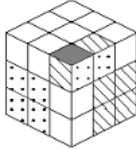
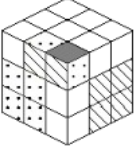
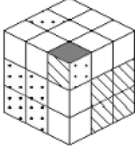
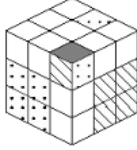
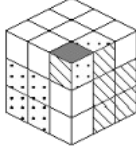
Gan

棱换		01. (R U' R) (U R U R) (<u>U'</u> R' <u>U'</u> R2) 02. (R2' U) (R U R' <u>U'</u>) (R' <u>U'</u>) (R' U R') 03. M2 U M2 U2 M2 U M2 04. (U R' <u>U'</u>) (R <u>U'</u> R) (U R <u>U'</u>) (R' U R U) (R2 <u>U'</u>) (R' U) 01'. (R2 <u>U'</u>) (R' <u>U'</u> R U R U) (R <u>U'</u> R) 02'. (R' U R' <u>U'</u>) (R' <u>U'</u>) (R' U) (R U R'2)
角换		05. x' R2 D2 (R' <u>U'</u> R) D2 (R' U R') 06. x' (R U' R) z' (R'2 <u>U'</u> L U R2' x y R2) 上式中的 R2' x y 是同时进行的 07. x' (R U' R' D) (R U R') u2' (R' U R) D (R' <u>U'</u> R)

邻角 对棱 对角 邻棱		08. $(R \ U \ R' \ \underline{U}')(R' \ F)(R^2 \ \underline{U}' \ R' \ \underline{U}')(R \ U \ R' \ F')$ 09. $\underline{U}'(R'U \ R \ \underline{U}' \ R'^2 \ b')x(R'U \ R)y'(R \ U \ R' \ \underline{U}' \ R^2)$ 10. $(R' \ U \ R' \ \underline{U}')y^2(R' \ U \ R' \ \underline{U}'R^2)xz'(R'\underline{U}'R \ U \ R)$ 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'. $z(U' \ R \ U' \ l')z(R' \ U \ R'U')(l \ R)$ $(U' \ R' \ U \ R \ U)$
邻角 邻棱 换		12. $z(\underline{U}' \ R \ D')(R^2 \ U \ R' \ \underline{U}' \ R^2 \ U)z'(R \ U')$ 13. $(R \ U \ R'F')(R \ U \ R' \ \underline{U}')(R'F \ R^2 \ \underline{U}'R'U')$ 14. $(R' \ U^2)(R \ U' \ \underline{U}')(R' \ F \ R \ U \ R' \ \underline{U}')(R'F' \ R^2 \ \underline{U}')$ 15. $(R \ U' \ \underline{U}')(R' \ U^2)(R \ \mathcal{B}' \ R' \ \underline{U}')(R \ U \ R \ \mathcal{B} \ R^2' \ U)$
三角 三棱 换		16. $(R^2' \ \underline{u}' \ R \ U' \ R)(U \ R' \ u)(R^2 \ fR' \ f)$ 17. $(R \ U \ R')y'(R^2' \ u' \ R \ U')(R' \ U \ R' \ u \ R^2)$ 18. $(R^2 \ u)(R' \ U \ R' \ \underline{U}')(R \ u')(R^2' \ F \ \underline{U} \ \mathcal{A})$ 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. $z(\underline{U}' \ R \ D')(R^2 \ U \ R' \ \underline{U}')z'(R \ U \ R')$ $z(R^2 \ U \ R')z'(R \ U')$
说明	符号系统：RLUDBF, 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	

-*F2l 手法

Gan

 $(R \ U' \underline{U}' \ R' \ U)^2 \ y' (R' \ \underline{U}' \ R)$	 $(U \ R \ \underline{U}' \ R' \ \underline{U}') \ y' (R' \ U \ R)$	 $(R' \ F \ RU)(R \ U' \ R' \ F)$ $U' (F' R U R' U') (R' F R)$	
 $(R \ U \ R' \ U') (R \ U' \underline{U}' \ R' \ U') (R \ U \ R')$	 $(R \ U' \ R \ U) y (R \ U' \ R' \ F^2)$	 $y' (R' \ \underline{U}' \ R \ U) (R' \ \underline{U}' \ R)$	 $(R \ U' \ R' \ U) (R \ U' \ R')$
 $(R U' R' U) (R \ U' \underline{U}' \ R' U) (R U' R')$	 $R^2 \ y (R \ U \ R' \ \underline{U}') y' (R' \ U \ R')$	 $y' (R' \ U) (R \ \underline{U}') (R' \ U \ R)$	 $(R \ U \ R' \ \underline{U}') (R \ U \ R')$
 $(R \ U \ R' \ \underline{U}')^2 (R \ U \ R')$	 $(R \ \underline{U}' \ R') \ y' (R' \ U^2 \ R)$		
 $y' (R' \ U^2) (R \ U \ R' \ \underline{U}') R$	 $y' \ \underline{U}' (R' \ U^2) (R \ \underline{U}' \ R' \ U) R$	 $y' (R' \ U \ R \ U' \underline{U}') (R' \ \underline{U}' \ R)$	 $y' (U^2 \ R^2 \ U^2) (R \ U \ R' \ U \ R^2)$ $(R \ U \ R' U) (R \ U' \underline{U}' \ R' d) (R' U \ R)$
 $(R \ U \ R') U^2 (R \ U \ R' \ \underline{U}') (R \ U \ R')$	 $(R \ U' \ R' \ U^2) (R \ U \ R')$	 $U (R \ U' \underline{U}') (R' \ U \ R \ U') R'$	 $(R \ U' \underline{U}') (R' \ \underline{U}' \ R \ U) R'$

$\underline{U}'(R \underline{U}')(R' U2)(R U' R')$	$\underline{U}'(R U R') d (R' \underline{U}' R)$		
$d (R' U R U')(R' \underline{U}' R)$	$y' (R' \underline{U}' R)$	$(d R' \underline{U}' R U')(R' \underline{U}' R)$	$y' (R \underline{U}' R') R'2 \underline{U}' R2 \underline{U}' R'$ $U'(R \underline{U}' R' d)(R' U' R)$
$y' (R' U)(R d' \underline{U}')(R U R')$	$U' (R \underline{U}' R')(R' U2)(R U' R')$	$U'(R U R' U')(R \underline{U}' R')$	$U R U' R'$
$\underline{U}' (R \underline{U}' R' U)(R U R')$	$d (R' U' R) d' (R U R')$		
$y' \underline{U}' (R' U R)$	$(d R' \underline{U}' R \underline{U}' R')(R' U R)$	$d (R' U2)(R \underline{U}' R')(R' U R)$	$(R U' R' U)(d R' \underline{U}' R)$
$(R U')(R' U)(R U')(R' U2)(R U' R')$	$\underline{U}'(R U R' U)(R U R')$	$(R U R')$	$\underline{U}' (R \underline{U}' R' U)(R U R')$

加下划线的是用左食指完成，斜体是用右拇指

浅蓝色的是最少步数版本

红色是新增的多解

新修正