Advanced Math Shorts Grover Exponential Speed polynomial (1) Speed optimal optimal 0 -> No classical als can superlade Grover algorithm Wide spread applications 1) ML alg. we use Grover's algorithm or its variants. J: 80,13 → 80,13 find & X E & O, 1 } s.t. f(X)=1 Let n=3 f-domain f- range (STA) 0010 f(000) = 0 010 f (111) = 0 011 0 classical algorithm O(2h) Complexity Grovers als. O (V2m) Still exponential but polynomia Improvement.

Grovers algorithm

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Key Idea	IA>	
Poste :	The sale of the sa	18:10 ·
1A) represents equal supe	= x = 1	h)
I all tere injults.		
ta s.t. f(x)=1		
En:	To !	\rightarrow $/ B >$
f-domain f-son	general and the	7
000	Net /A) = 0	Cin
001	(s = 73 / 0)	A. (1)
0 10	Let 1A> = V3 0	
V 103(1 - 2 1-1/2)	- 1 3 0	
100	· Hammell sty (6	J
101 0	(0	7 2 .
110	Let 1B) = 17	·
	J. X (10) 13 / C	5 1200 17.
Above: three on world a		- W - W - 1
Above: three opps yeld +		
remaining of Ps dield fal	(se	
Vactors IA) and IB) are or	thogal to each other	~ LAIB>=a
1h) Created Using Hadamar	d Jacks.	
Let the angle between to 1B)	and In > is a . I for	
Our goal is to move Register	x to move closes to	- 1A>
Action 1: Reflect X over 1B	Y .	
	> IATA X	うでか ×=1か
2. Refree X over 1h)		
NOW X moved towards IA)	> \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Q
Repeat Action I and Action:	20	5/8837317 A 18/
	(T) B Reser	- War i
)- import plant that do	170 70 77 5 11 ins	×
	+ Handage of and	

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Steps in Grover's algorithm:

- 1 Create equal superposition of all possible imputs in Ih)
- 2) for (i = 1 to LEVN]) { X = Reflect X over 1B> X = Reflect x over 1h>

11 high props toger the answer 3 Measure X

Yest do 1) why we have 14 VN Grover rotations.

10-11-11-01-(3-21) A. Cell B

- 1 Math of Grover's rotation
- 3 Quantum Crocent
- (4) Calculate Prob. of Sciccem
- (5) Working Example

to make the set of the first body in the service of the

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