

HW5 Problem 2 NOT on quiz!

HW 5 P3

$S = \{ \langle M \rangle \mid M \text{ is a DFA that accepts } w^R \}$
whenever it accepts w .

Show S is decidable.

Sketch

- Construct M_R : M with flipped start + accept states
- Construct M^C : M with flipped accept states
 $\rightarrow L(M) \cap L(M^C) = \emptyset$

$L(M_R)$ is going to be w^R & $w \in L(M)$

$\rightarrow L(M_R) \subseteq L(M)$ because M accepts all reverse w^R

~~$\therefore L(M_R) \cap L(M^C) = \emptyset$~~

$\text{supp } f(k) \cap \text{supp } f(l) = \emptyset$

and $\|f\|_{L^2(\mathbb{R}^d)}^2 = \|f_k\|_{L^2(\mathbb{R}^d)}^2 + \|f_l\|_{L^2(\mathbb{R}^d)}^2$

$\Rightarrow f(k) \in \mathcal{F}_k, \quad f(l) \in \mathcal{F}_l$

$\|f\|_{L^2(\mathbb{R}^d)}^2 = \|\phi_k\|_{L^2(\mathbb{R}^d)}^2 + \|\phi_l\|_{L^2(\mathbb{R}^d)}^2$

$\Rightarrow \|f\|_{L^2(\mathbb{R}^d)}^2 = \sqrt{\|\phi_k\|_{L^2(\mathbb{R}^d)}^2 + \|\phi_l\|_{L^2(\mathbb{R}^d)}^2}$

- consequence: we have obtained equality

$\|f\|_{L^2(\mathbb{R}^d)}^2 = \|\phi_k\|_{L^2(\mathbb{R}^d)}^2 + \|\phi_l\|_{L^2(\mathbb{R}^d)}^2$

- consequence: $f \in \mathcal{F}_k \cup \mathcal{F}_l$

problem 2: ℓ^2 approximation

representation of ϕ in basis $\{\phi_k\}$

$\phi = \sum_k c_k \phi_k + \text{term of small norm in } \ell^2$

hand 3:

Hm 2 JAPAN 3 VOL ONE PDS

$R =$ "On input $\langle M \rangle$ where M is a DFA ,

1. Construct M_R :

- Construct N_R^{NFA} , which M with all start & accept states flipped & δ reversed
- Convert N_R to a $\overset{\text{DFA}}{\cancel{M}}$ M_R

2. Construct M^c :

- flip accept states of M
- (If $L(M^c) \cap L(M_R) \neq \emptyset$, then M does accept all reverse strings.)

3. Use E_{DFA} to see if $L(M^c) \cap L(M_R)$ is empty

- IF empty, accept
- Else, reject. "

$R' =$ "On input $\langle M \rangle$ where M is a DFA ,

1. Construct M_R

(Same as above)

2. Use EQ_{DFA} to see if $L(M) = L(M_R)$

→ IF yes, accept

→ Else, reject "

2
AFT is a 14 year old female R

area, light brownish.

spotted with dark brownish

irregular brownish patches

and some of yellowish

blackish brownish.

has white spots with

dark brownish blackish brownish

irregular patches like brownish

blackish brownish blackish brownish

blackish brownish blackish brownish

blackish brownish blackish brownish

AFT is a 14 year old female R

area, light brownish.

blackish brownish

blackish brownish blackish brownish

blackish brownish blackish brownish

blackish brownish blackish brownish

Reducibility ($A \leq B$)

- Assume B is decidable
- Build machine that uses B to decide A

Mapping Reducibility ($A \leq_r B$)

~~Build a machine M that decides A~~

- Build a machine M' that takes input x and returns y s.t.

$$x \in A \xleftarrow{\quad} y \in B$$

↑

$f(x)$

STATE WHICH KIND OF PROOF YOU'RE
DOING !!!

Figure 11

Surface magnetic field distribution



Key to symbols

- solid line = given magnetic field

- dashed or dotted line = given magnetic field

approximate field

Magnetic field gradient ($\nabla \times \mathbf{B}$)

- solid line = given field gradient $\nabla \times \mathbf{B}$ if positive

- dashed line = given field gradient

Magnetic field gradient ($\nabla \times \mathbf{B}$)

HW5 P6

$T = \{\langle M \rangle \mid M \text{ is TM that accepts } w^R\}$
whenever it accepts w .

WTS: $A_{TM} \leq_R T$ ← mapping reducibility

Build a machine R that computes f s.t.

$$\langle x, M \rangle \in A_{TM} \iff f(x) \in T$$

$$\langle x, M \rangle \notin A_{TM} \iff f(x) \notin T$$

IF x is accepted by M $\iff f(x, M) \rightarrow M'$ s.t.

M' accepts w^R whenever it accepts w

IF x is not accepted by M $\iff f(x, M) \rightarrow M'$ s.t.

M' does not always accept w^R whenever it accepts w

R = "On input $\langle M, w \rangle$,

1. Build a machine M' that accepts only 01
2. IF ($w \in L(M)$) w is accepted by M ,
 \iff Adjust M' also accept 10
 IF $w \notin L(M)$
 $\rightarrow M'$ rejects 10 (don't modify M') ~~10000~~
3. Output M' "

DATE : 19/12/2018
TIME : 10:00 AM
FINDS : 10

$$EQ_{CFG} = \{ G, H \mid G \text{ and } H \text{ are CFGs and } L(G) = L(H) \}$$

→ we know ALL_{CFG} is undecidable

$$\text{ALL}_{\text{CFG}} \leq \text{EQ}_{\text{CFG}}$$

$$J \in AU_{CFG} \longleftrightarrow f(J) \rightarrow G, H \in EQ_{CFQ}$$

$$\begin{cases} \text{If } L(J) = \Sigma^* \longleftrightarrow L(G) = L(H) \\ \text{If } L(J) \neq \Sigma^* \longleftrightarrow L(G) \neq L(H) \end{cases}$$

Important part

$E = "On\ input \langle J \rangle \leftarrow CFG"$

1. Let H be a CFG that generates Σ^* ($L(H) = \Sigma^*$)



2. Output $\langle J, H \rangle$

If $L(J) = \Sigma^*$, then $\langle J, H \rangle \in EQ_{CFG}$
 If $L(J) \neq \Sigma^*$, then $L(J) \neq L(H) \Rightarrow \langle J, H \rangle \notin EQ_{CFG}$