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UNIVERSITI TEKNOLOGI MALAYSIA

UNIVERSITI TEKNOLOGI MALAYSIA

FACULTY OF ENGINEERING

SCHOOL OF COMPUTING

SESSION 2020/2021 SEMESTER 1

SCSJ 3553: ARTIFICIAL INTELLIGENCE

SECTION 07

ASSIGNMENT 1

COVID-Multi Scanner(CMS)

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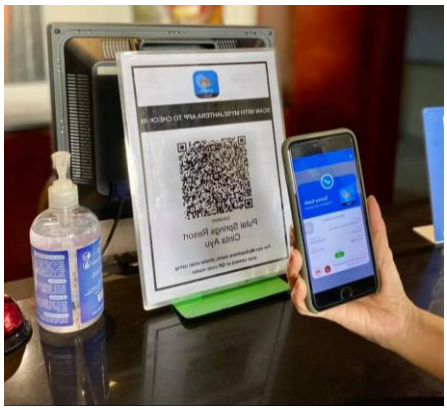
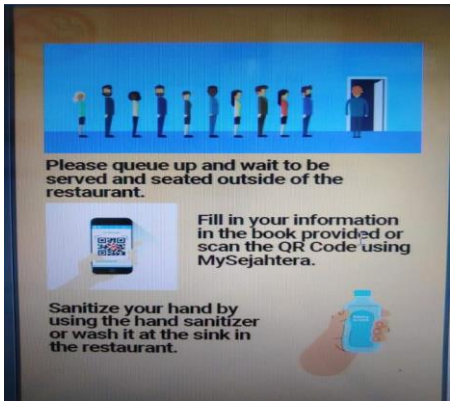
1. KNOWLEDGE REPRESENTATION

1.1 Problem

Current Situation:

Every citizen in Malaysia has responsibility to obey the lockdown rules when leave their home. Every citizen needs to wear mask for all the time to ensure the safety of them. No everyone will follow the rules and wearing qualified mask. Before the users go into a shop, they need to line up for attendance scanning and take body temperature by themselves. After scan the QR code for each shop, the attendance will record in check-in history.





However, the rules had caused some inconvenience to the citizen. They still able to enter the shop when there is not staff around there to check and ensure the temperature is lower than 37.5 C. Sometimes the Mysejahtera app will display error page and it is wasting time. This is inconvenient when someone is laden with bags or something. Furthermore, that it is wasting time because they need to wait in a queue and increase the risk of transmission for covid-19. Besides, it is inconvenient when their phone is in an insufficient power situation or no phone especially for senior citizens. The owners and customers need pay for the unnecessary expense if they missed follow one of the rules.

Applying COVID-Multi Scanner (CMS)

Since some of the citizens violate the rules such as not scanning the attendance and not wearing masks when hanging out thus causing an epidemic happening right now has high probability to recur and become serious.

Our proposed solution is using the automatic face detection integrated with a temperature scanner instead of scanning attendance by using a phone. The users can line up to scan the face, temperature and mask by using COVIDMulti Scanner(CMS). It will reduce the take taken and reduce the exposure of risk.

The users can scan their attendance with or without face mask scanning. After scanning the face, their attendance will be recorded. So the users can scan their attendance without using the phone. Besides, it can ensure all people scan the attendance before going into a place or shop. The COVIDMulti Scanner(CMS) included the mask detection which detects whether the user has a mask or not. Besides, the temperature detection is to scan the temperature of the user. To make an alert or signal for the user who does not follow the rules or unsatisfied body condition, the proposed COVIDMulti Scanner(CMS) have included a sound indicator.

When the user is not wearing their mask or temperature not below 37.5 C, the sound indicator will go on automatically. Hence, the users cannot go into a place or shop. If the condition is satisfied, the sound indicator is still in the off state.

With the proposed COVIDMulti Scanner(CMS), the citizen can obey the lockdown rules easily and it can avoid unnecessary expense in this emergency period thus reducing the risk of transmission of covid-19.

1.2 Knowledge Representation (KR)

T <= 37.5	Face_detect,F	Mask_detect,M	Sound_indicator,S
T	T	T	F
		F	T
	F	T	T
		F	T
F	T	T	T
		F	T
	F	T	T
		F	T

KR1:

IF (T <=37.5) = **TRUE AND** F = **TRUE AND** M = **TRUE THEN** S = **FALSE**

KR2:

IF (T <= 37.5) = **TRUE AND** F = **TRUE AND** M = **FALSE THEN** S = **TRUE**

KR3:

IF (T <=37.5) = **TRUE AND** F = **FALSE AND** M = **TRUE THEN** S = **TRUE**

KR4:

IF (T <=37.5) = **TRUE AND** F = **FALSE AND** M = **FALSE THEN** S = **TRUE**

KR5:

IF (T <=37.5) = **FALSE AND** F = **TRUE AND** M = **TRUE THEN** S = **TRUE**

KR6:

IF (T <=37.5) = **FALSE AND** F = **TRUE AND** M = **FALSE THEN** S = **TRUE**

KR7:

IF (T <=37.5) = **FALSE AND** F = **FALSE AND** M = **TRUE THEN** S = **TRUE**

KR8:

IF (T <=37.5) = **FALSE AND** F = **FALSE AND** M = **FALSE THEN** S = **TRUE**

2. Explanation of Knowledge Representation

KR1:

IF (T<=37.5) = TRUE AND F = TRUE AND M = TRUE THEN S = FALSE

- When Temperature below 37.5 or equal to 37.5 , face and mask were detected , the sound indicator does not produce the sound.

KR2:

IF (T <= 37.5) = TRUE AND F = TRUE AND M = FALSE THEN S = TRUE

- When Temperature below 37.5 or equal to 37.5 , face is detected and mask is not detected , the sound indicator produces the sound.

KR3:

IF (T <=37.5) = TRUE AND F = FALSE AND M = TRUE THEN S = TRUE

-When Temperature below 37.5 or equal to 37.5 , face not detected and mask was detected , the sound indicator produces the sound.

KR4:

IF (T <=37.5) = TRUE AND F = FALSE AND M = FALSE THEN S = TRUE

- When Temperature below 37.5 or equal to 37.5 , face and mask were not detected, the sound indicator produced the sound.

KR5:

IF (T <=37.5) = FALSE AND F = TRUE AND M = TRUE THEN S = TRUE

-When Temperature above 37.5 or equal to 37.5 , face and mask were detected , the sound indicator produced the sound.

KR6:

IF (T <=37.5) = FALSE AND F = TRUE AND M = FALSE THEN S = TRUE

-When Temperature above 37.5 or equal to 37.5 , face was detected and mask not detected , the sound indicator produced the sound.

KR7:

IF (T <=37.5) = FALSE AND F = FALSE AND M = TRUE THEN S = TRUE

-When Temperature above 37.5 or equal to 37.5 , face not detected and mask were detected , the sound indicator produces the sound.

KR8:

IF (T <=37.5) = FALSE AND F = FALSE AND M = FALSE THEN S = TRUE

- When Temperature above 37.5 or equal to 37.5 , face and mask were not detected , the sound indicator produced the sound.

3. First-Order Logic (FOL)

KR1:

∀ T ∀ F ∀ M ((temp_sensor(T) <=37.5) ∧ (face_detect(F)) ∧ (mask_detect(M)) -> ∃ S(sound_indicator(S) ∧ ¬(ON(S))

KR2:

∀ T ∀ F ∃ M ((temp_sensor(T) <= 37.5) ∧ (face_detect(F)) ∧ ¬(mask_detect(M)) -> ∃ S(sound_indicator(S) ∧ (ON(S))

KR3:

∀ T ∃ F ∀ M ((temp_sensor(T) <= 37.5) ∧ ¬(face_detect(F)) ∧ (mask_detect(M)) -> ∃ S(sound_indicator(S) ∧ (ON(S))

KR4:

∀ T ∃ F ∃ M ((temp_sensor(T) <= 37.5) ∧ ¬(face_detect(F)) ∧ ¬(mask_detect(M)) -> ∃ S(sound_indicator(S) ∧ (ON(S))

KR5:

∃ T ∀ F ∀ M (¬(temp_sensor(T) <= 37.5) ∧ (face_detect(F)) ∧ (mask_detect(M)) -> ∃ S(sound_indicator(S) ∧ (ON(S))

KR6:

∃ T ∀ F ∃ M (¬(temp_sensor(T) <= 37.5) ∧ (face_detect(F)) ∧ ¬(mask_detect(M)) -> ∃ S(sound_indicator(S) ∧ (ON(S))

KR7:

∃ T ∃ F ∀ M (¬(temp_sensor(T) <= 37.5) ∧ ¬(face_detect(F)) ∧ (mask_detect(M)) -> ∃ S(sound_indicator(S) ∧ (ON(S))

KR8:

∃ T ∃ F ∃ M (¬(temp_sensor(T) <=37.5) ∧ ¬(face_detect(F)) ∧ ¬(mask_detect(M)) -> ∃ S(sound_indicator(S) ∧ (ON(S))

4. Explanation of KR to Achieve the Goals

1. The first goal is to create an AI that able to record places visit by the people to replace Mysejahtera application that use smartphone. By manipulating Face, F, that will detect the people by their face which F = True and F = False. By this the devices can identify the person identification to be recorded into the government system to track the close contact of Covid-19.
2. Help to identify the people whether wear facial mask or not wear facial mask. People need to wear facial mask when they are in outside. By manipulating Facial_Mask, M, that will detect the facial mask if people use to wear facial mask which M = True and M = False. By this the devices can detect if the person wear facial mask or not wear facial mask.
3. Usually, when there is a person with higher body temperature which is more than 37.5 Celsius is one of the symptom of Covid-19. The body temperature of a person have been taken by the devices. It can be represent by T <= 37.5 for normal body temperature and T >37.5 for higher body temperature. If the body temperature, T, lower that 37.5 Celsius, the face, F, can be detect and they wear a facial mask, M,