



E-SAN THAILAND CODING & AI ACADEMY

โครงการวิจัยโมเดลระบบนิเวศการเรียนรู้ที่บูรณาการ CODING & AI สำหรับเยาวชน
Model of Learning Ecosystem Platform integrate with Coding & AI for Youth



โครงการย่อยที่ 6

การพัฒนาเยาวชนเพื่อเข้าสู่วิชาชีพขั้นสูงด้าน Coding & AI
ร่วมกับ Coding Entrepreneur & Partnership: **Personal AI**

BiTNet: AI for Ultrasound Image Classification

ผศ.ดร.ธนพงศ์ อินทะ
ผู้เชี่ยวชาญด้าน Computer Vision



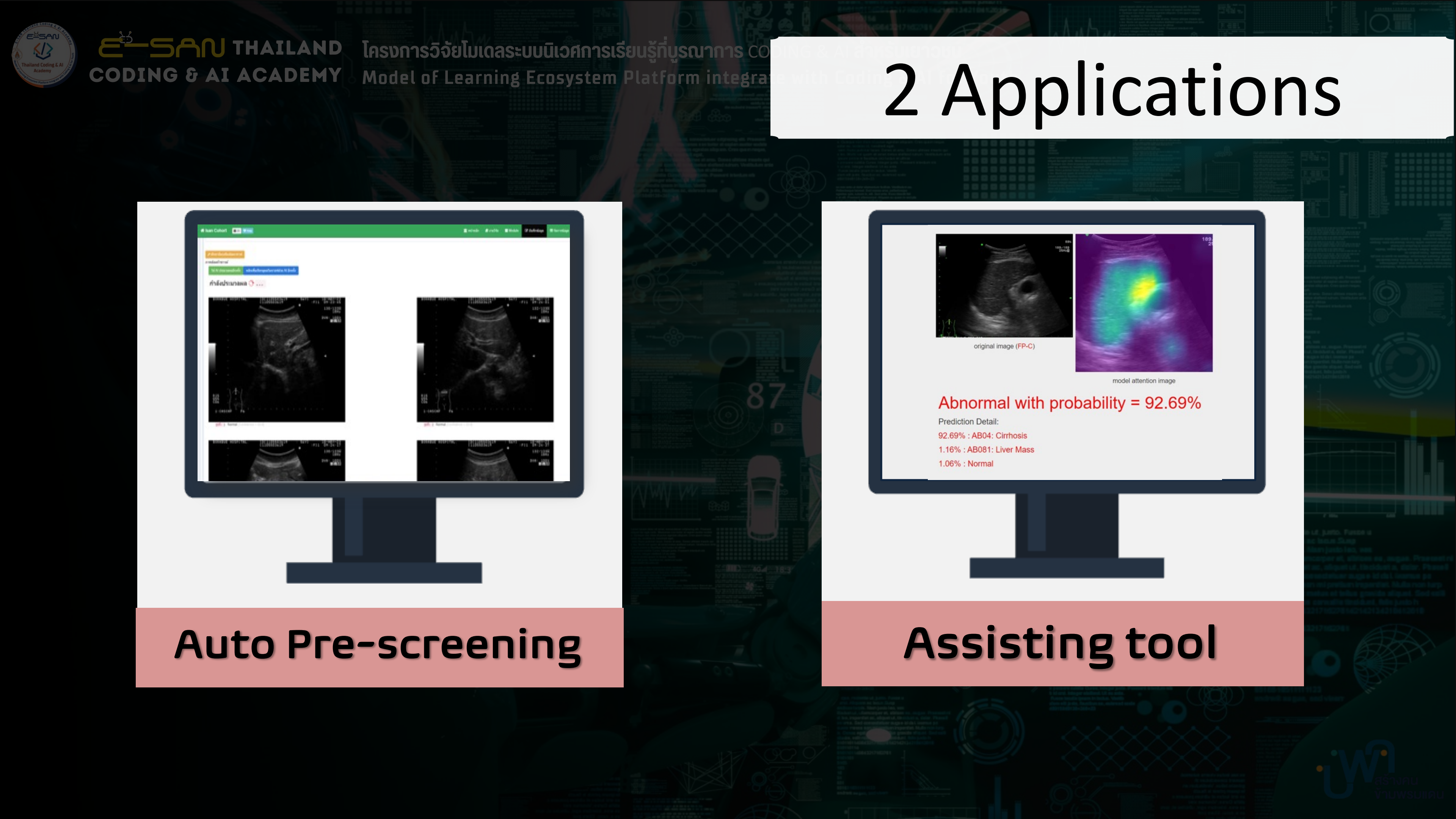
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CODING & AI ACADEMY

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Model of Learning Ecosystem Platform integrate with Coding & AI for Youth

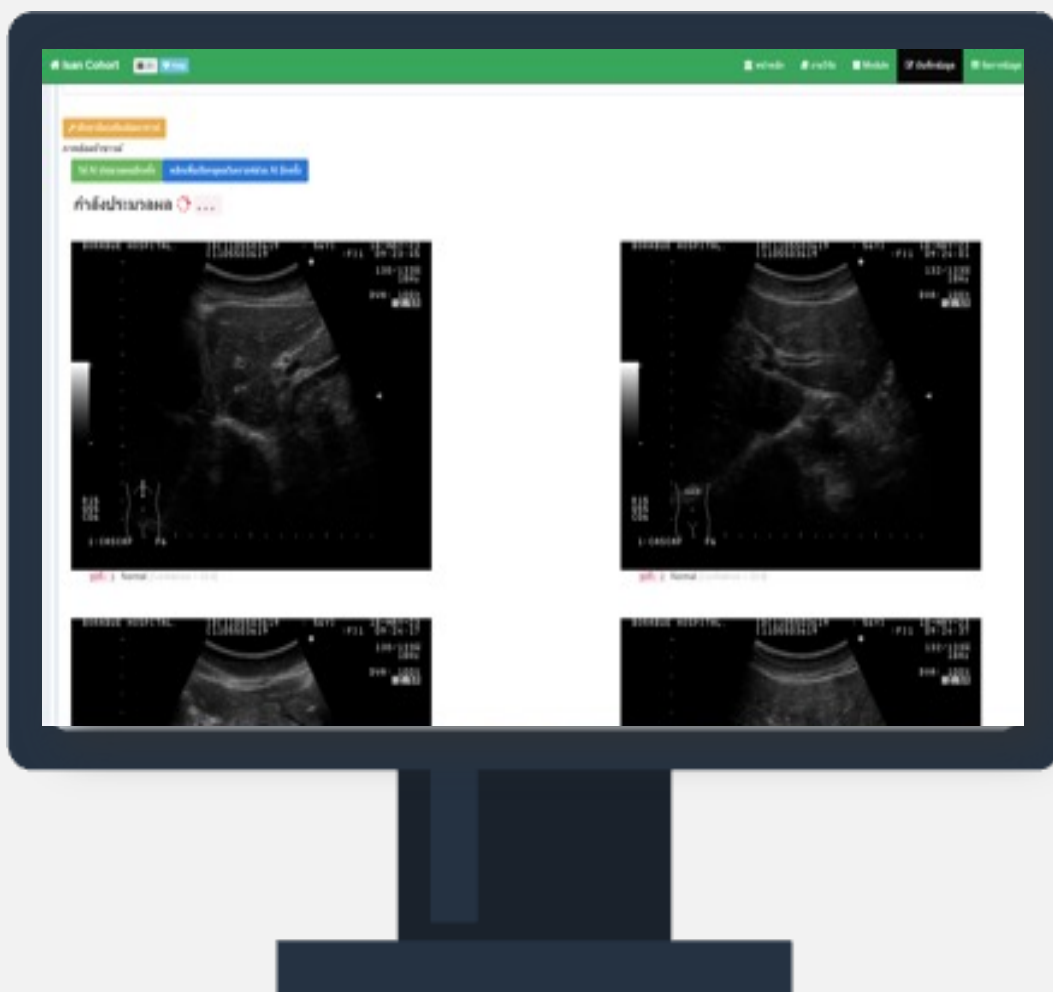
Add a little bit of body text

MS Visualization

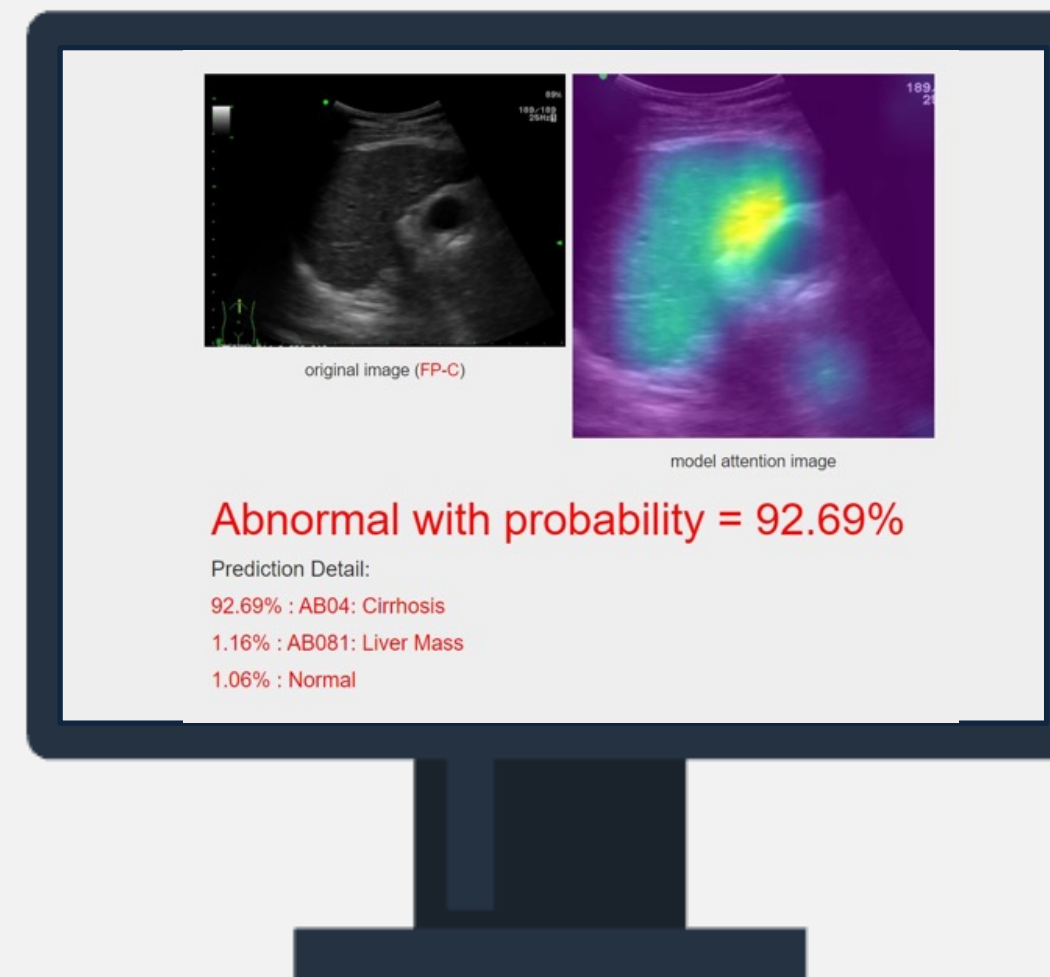
Visualization



2 Applications

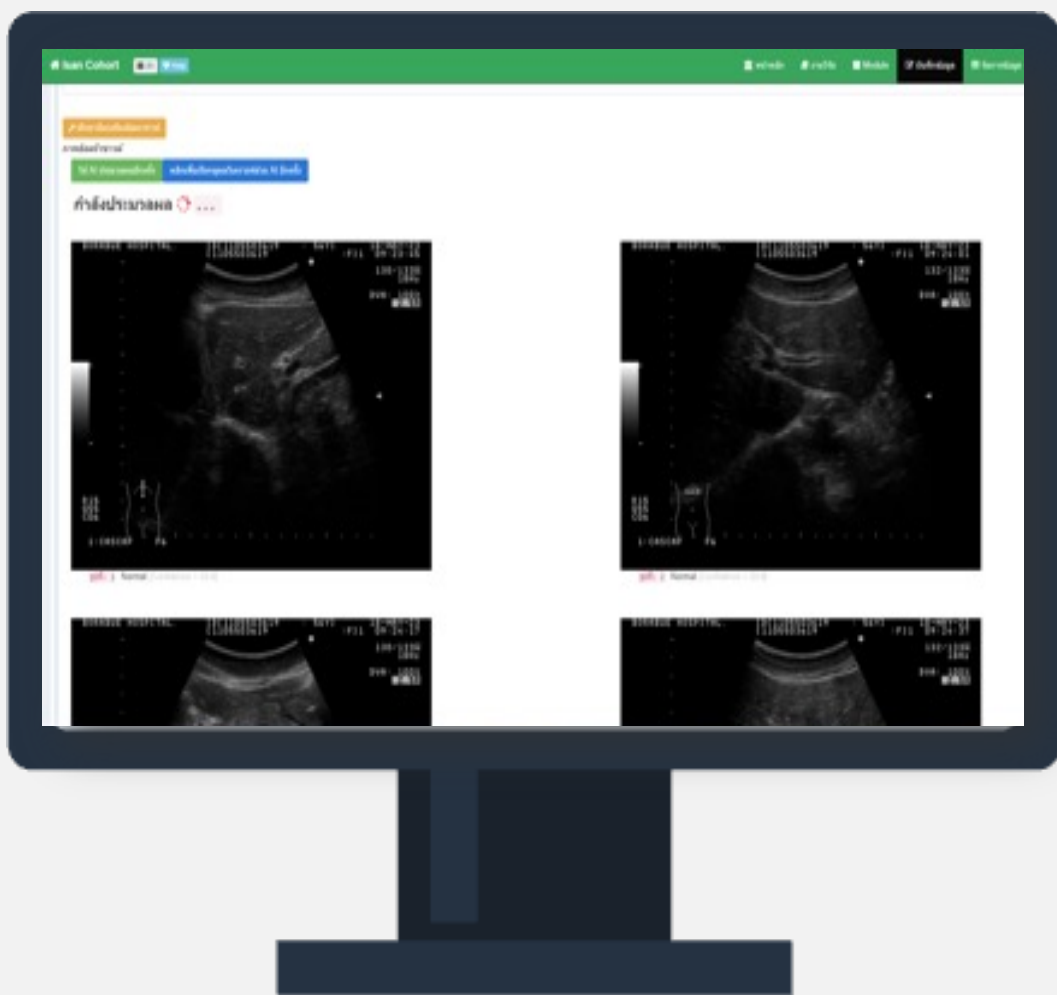


Auto Pre-screening



Assisting tool

1st Application



Auto Pre-screening

100% confidence normal

Abnormal with probability = 92.69%

Prediction Detail:

92.69% : AB04: Cirrhosis

1.16% : AB081: Liver Mass

1.06% : Normal

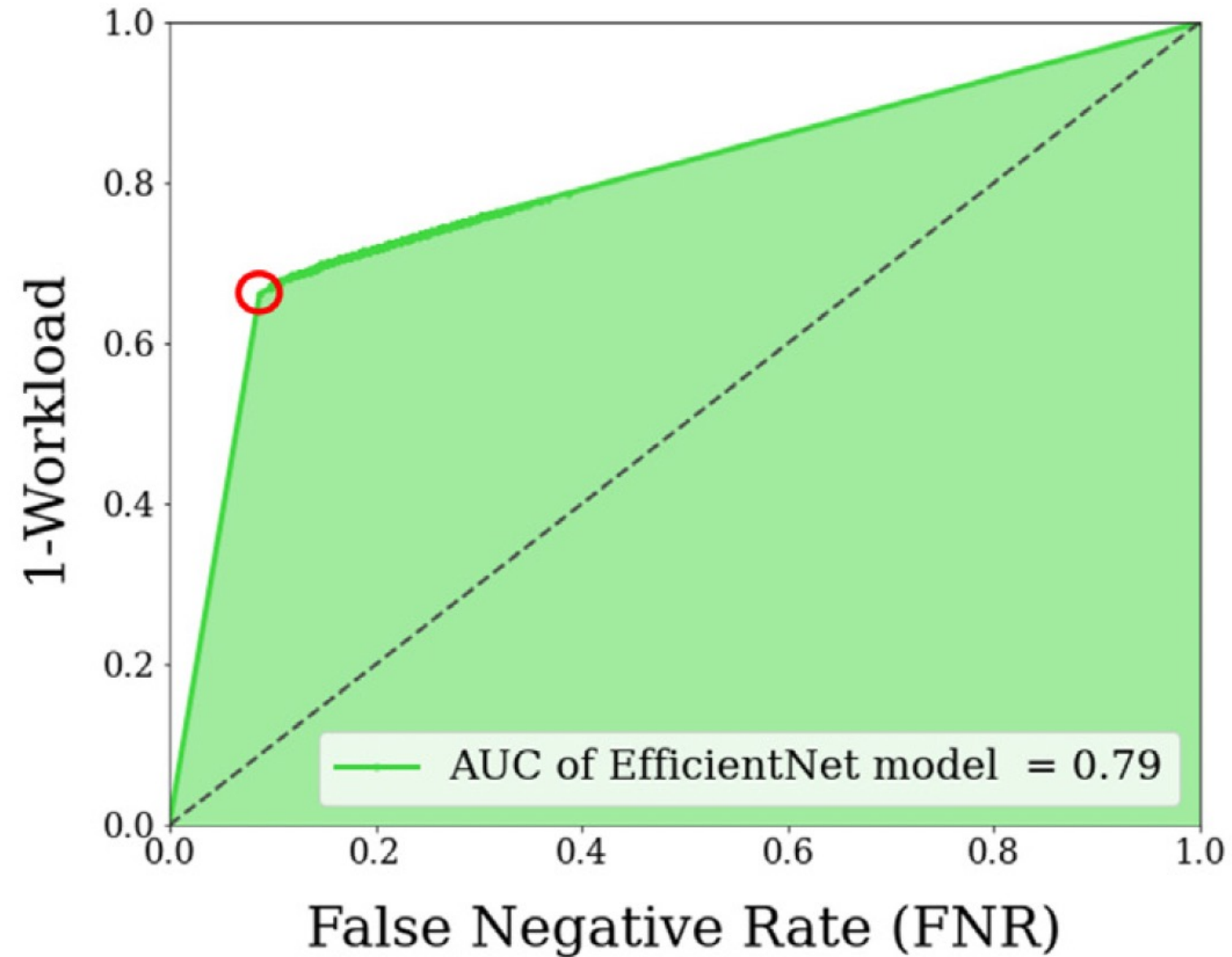
or

Otherwise

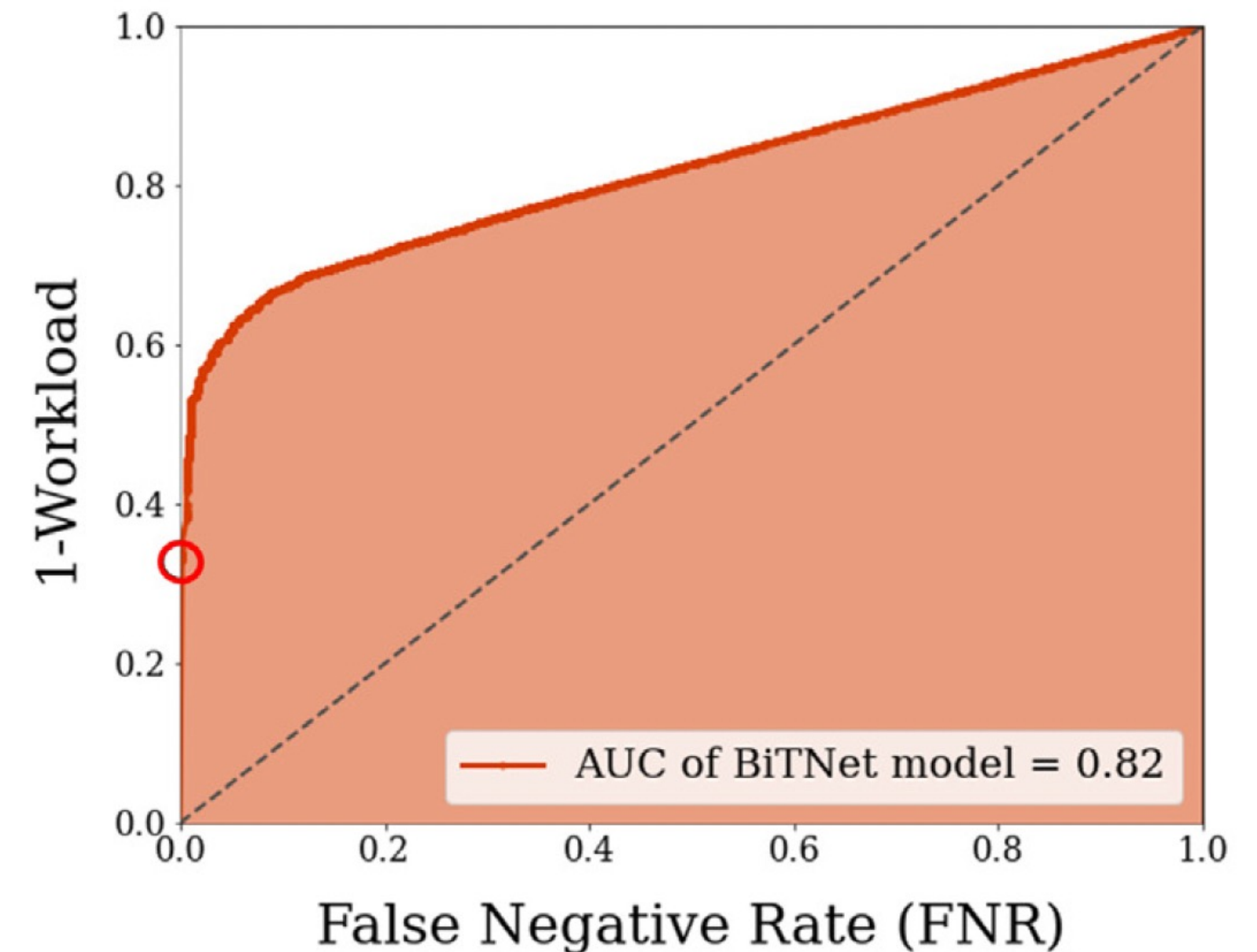
Assisting tool

Auto Pre-screening

Comparison between workload reduction-rate and false negative rate when varies-thresholds of the model.

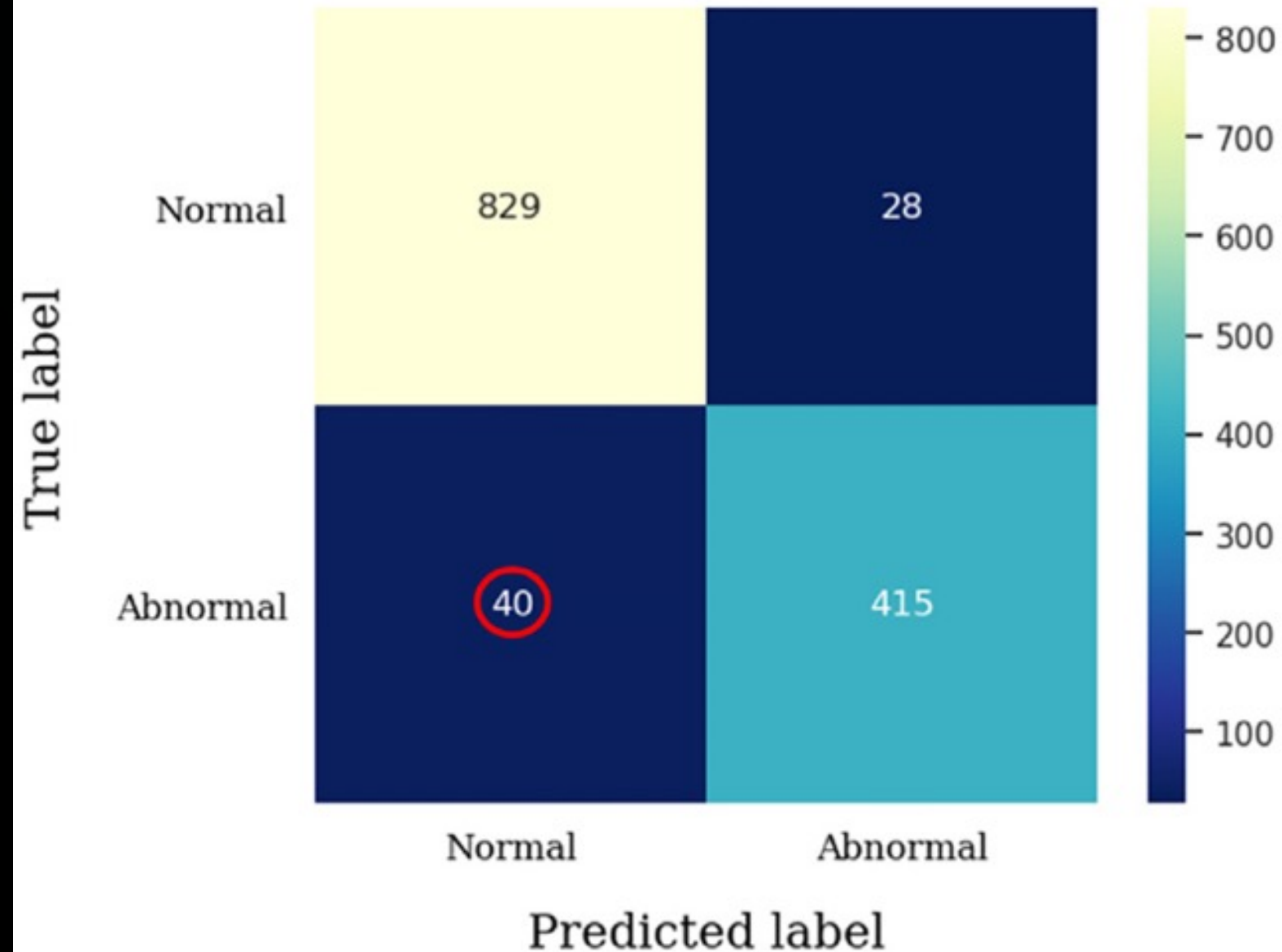


Comparison between workload reduction-rate and false negative rate when varies-thresholds of the model.

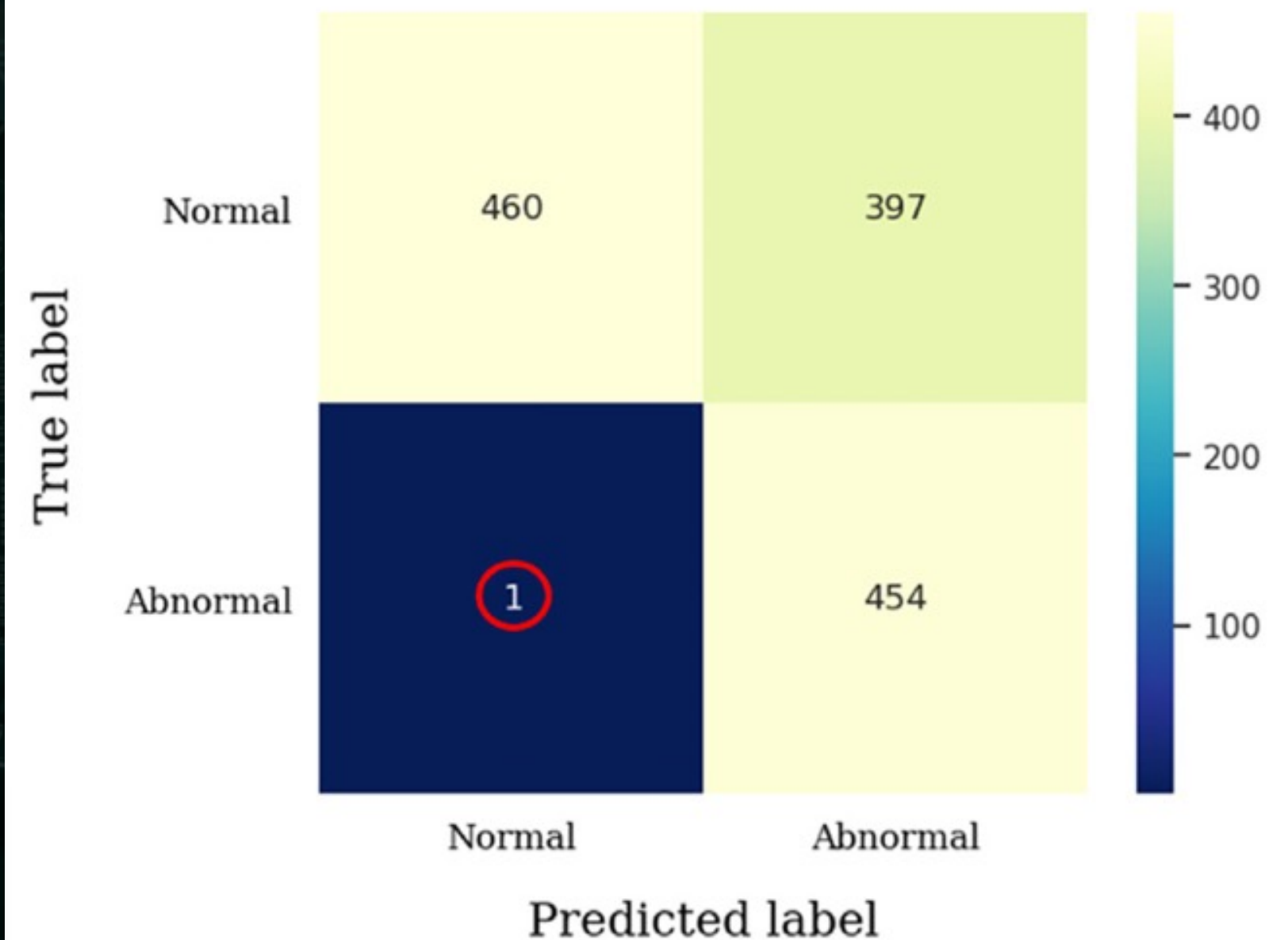


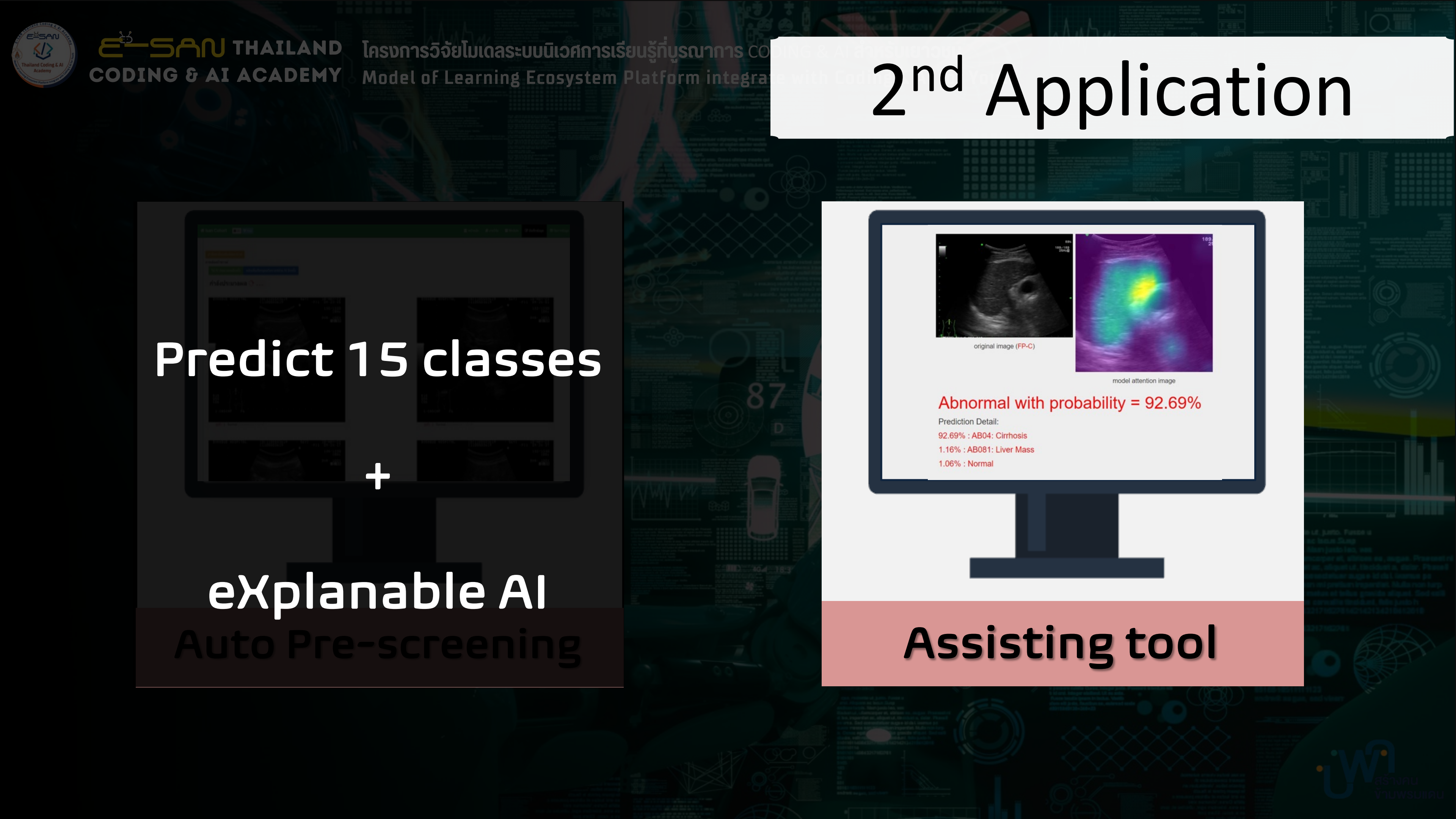
Auto Pre-screening

Confusion matrix (Normal/Abnormal class)
by EfficientNet model



Confusion matrix (Normal/Abnormal class)
by BiTNet model



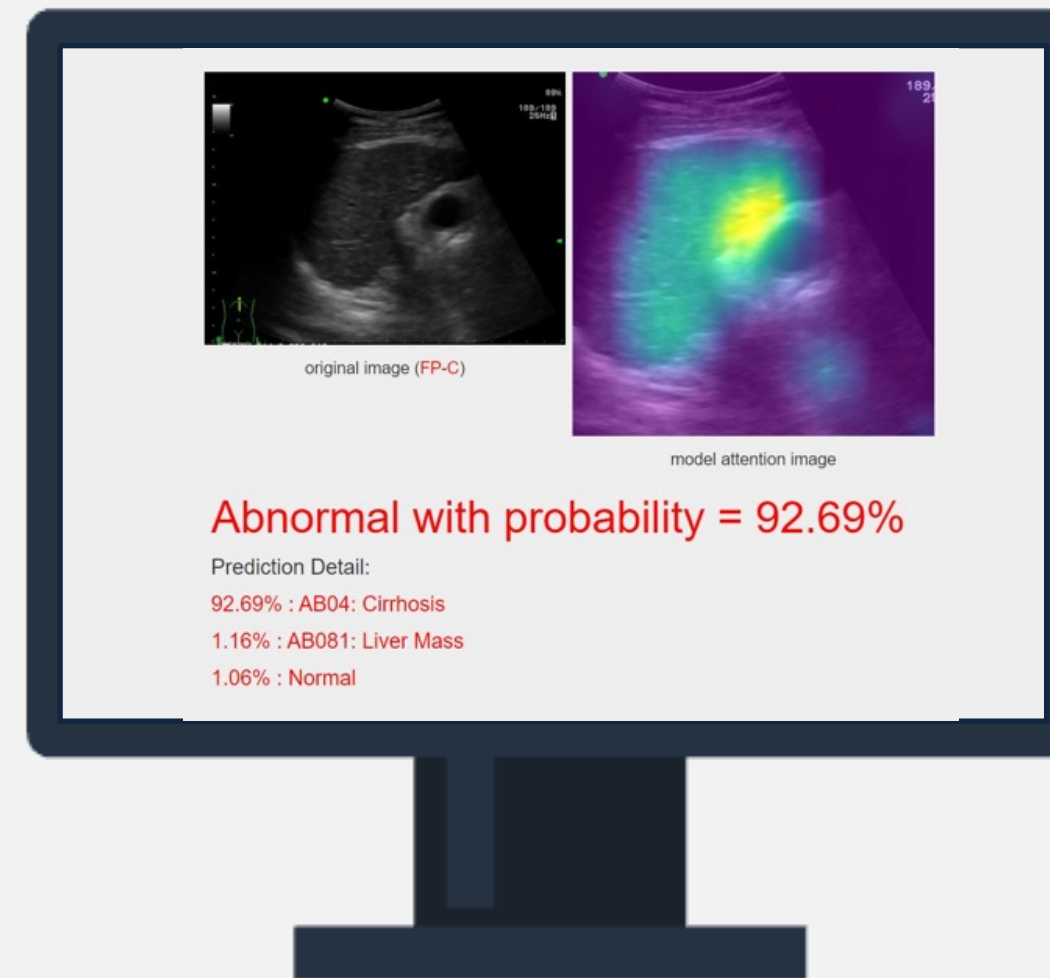


2nd Application

Predict 15 classes

+

eXplanable AI
Auto Pre-screening



Assisting tool

Assisting tool

1.The independent samples T-Test

- Compare the means of **mean difference** in prediction confidence of the **correct and incorrect** groups between the BiTNet model and the EfficientNet model.
 - **Hypothesis** : The means of mean differences of the BiTNet model were significantly higher than those of EfficientNet.

2. Paired Samples T-Test

- Compare of mean accuracy, precision, and recall of the diagnostic performance of the participants with and without assistance.

- **Hypothesis** : The mean accuracy, precision, and recall scores of the diagnostic performance of the participants with assistance were significantly higher than those without assistance.

- Compare of mean accuracy between the first round of the experiment and the second round of the experiment with the participants.

- **Hypothesis** : The mean accuracy scores no significant difference between the first round and the second round of the experiment.

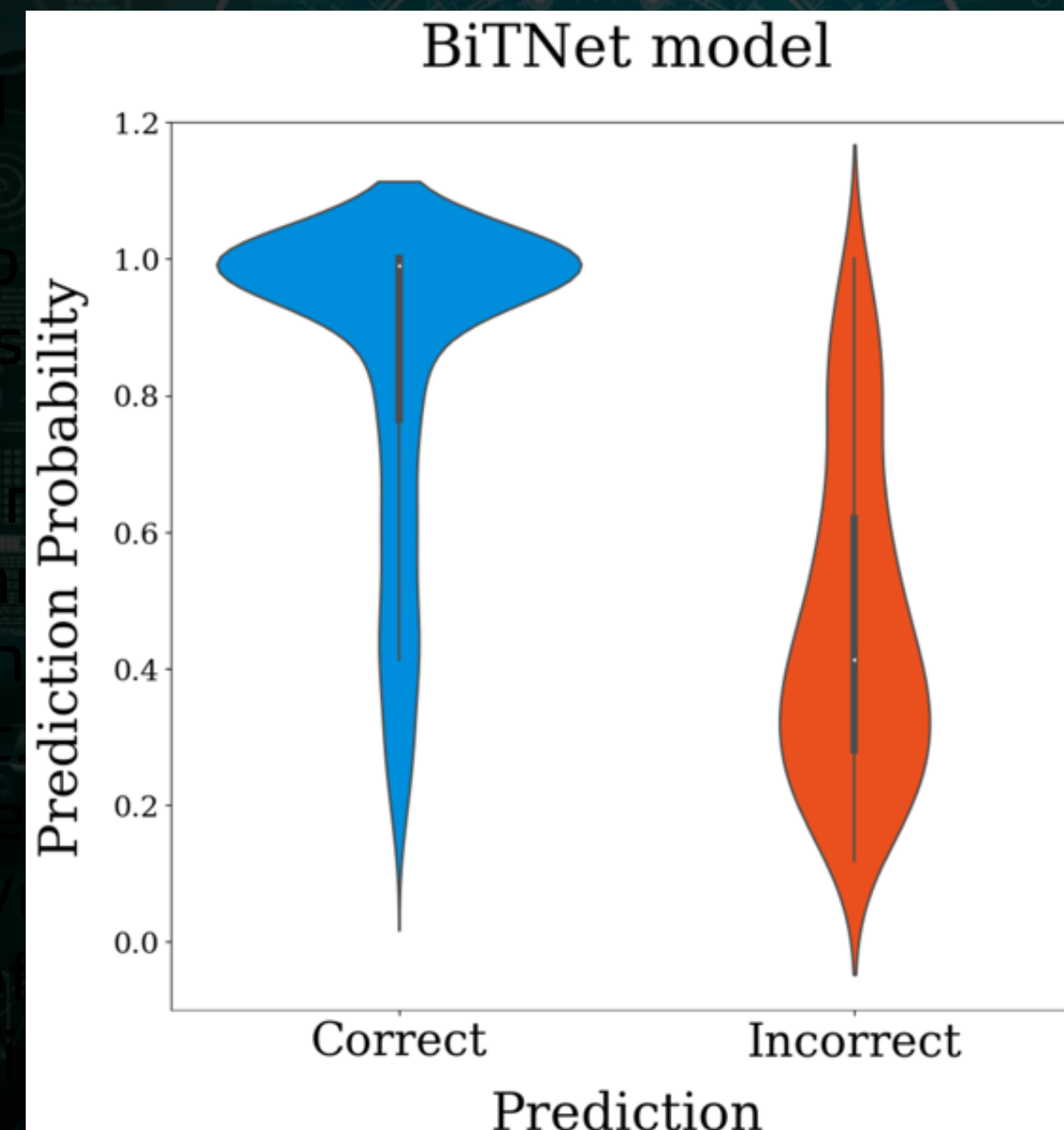
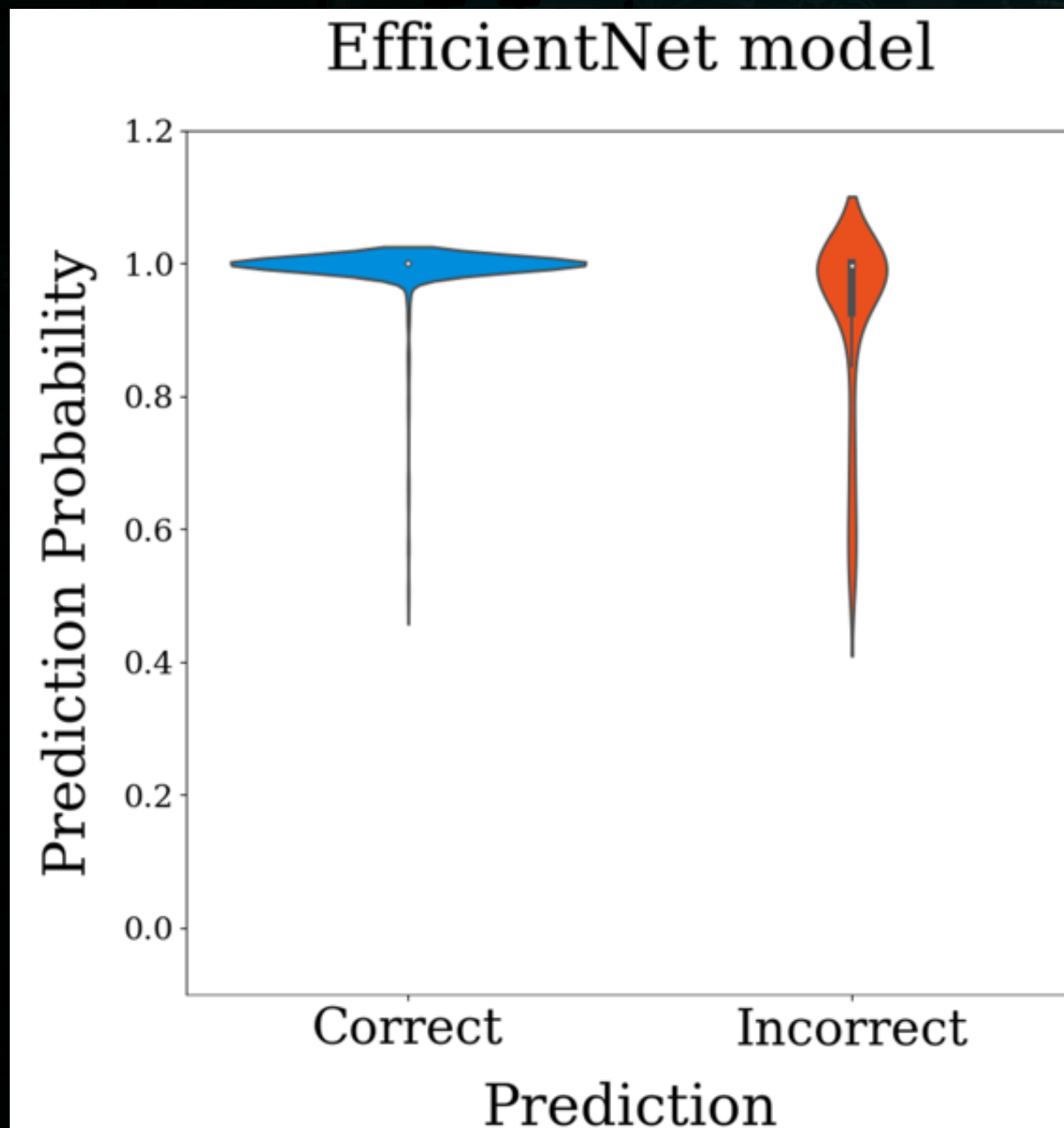
- Compare of mean similarity scores between AI suggestion (prediction) and the final decision of the participants when assisted/unassisted.

- **Hypothesis** : The mean similarity score of the assisted participants was significantly higher than that of the unassisted participants.

Assisting tool

1. The independent samples T-Test

- Compare the means of **mean difference** in prediction confidence of the **correct and incorrect** groups between the BiTNet model and the EfficientNet model.
 - **Hypothesis** : The means of mean differences of the BiTNet model were significantly higher than those of EfficientNet.



Assisting tool

1. The independent samples T-Test

1.1. Compare the means of mean difference in prediction confidence of the correct and incorrect groups between the BiTNet model and the EfficientNet model.

1.1.1. Hypothesis : The means of mean differences of the BiTNet model were significantly higher than those of EfficientNet.

2. The Paired Samples T-Test

➤ Compare of mean **accuracy**, **precision**, and **recall** of the diagnostic performance of the participants **with and without** assistance.

○ **Hypothesis** : The mean **accuracy**, **precision**, and **recall** scores of the diagnostic performance of the participants with assistance were significantly higher than those without assistance.

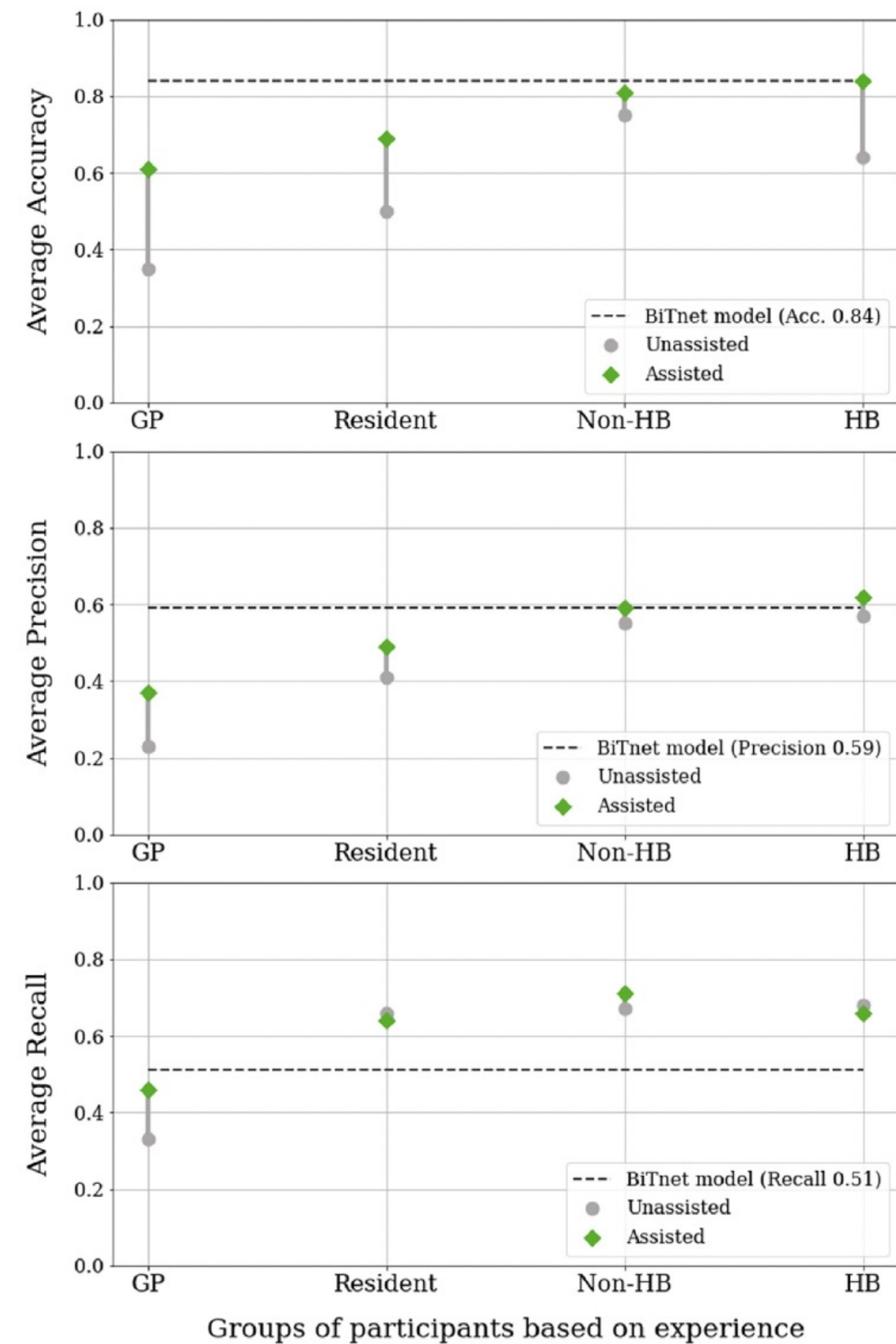
1.2. Compare of mean accuracy between the first round of the experiment and the second round of the experiment with the participants.

1.2.1. Hypothesis : The mean accuracy scores no significant difference between the first round and the second round of the experiment.

1.3. Compare of mean similarity scores between AI suggestion (prediction) and the final decision of the participants when assisted/unassisted.

1.3.1. Hypothesis : The mean similarity score of the assisted participants was significantly higher than that of the unassisted participants.

Assisted vs Unassisted Diagnosis of 15 classes (14 Ab + 1 Nomal)



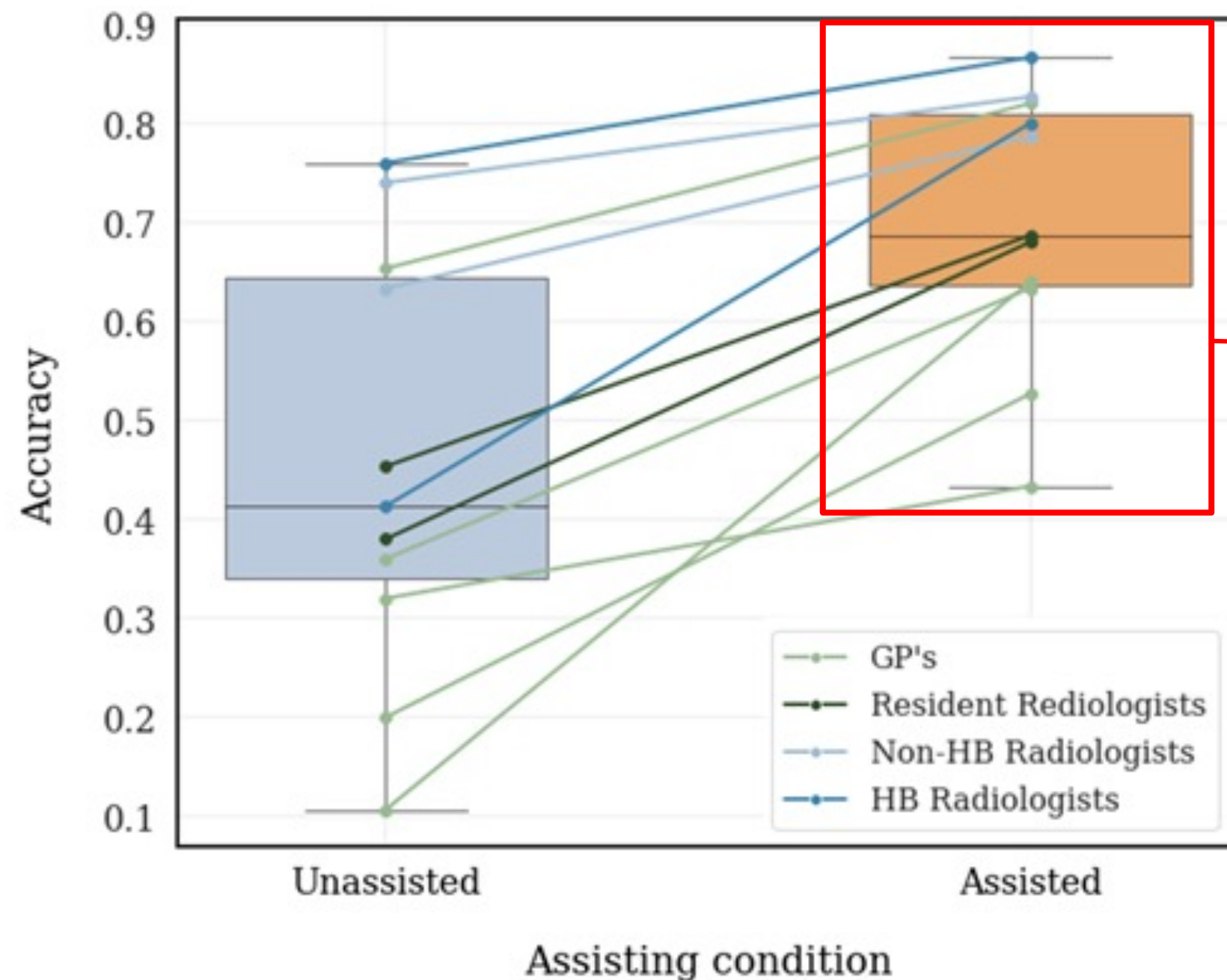
T-test

Assisted

Fig. 10. Comparing assisted versus unassisted diagnosis among four different groups of participants on accuracy, precision, and recall.

Assisting tool

Comparing accuracies between unassisted vs assisted



increase **overall's** accuracy
by **18%**

increase **GP's** accuracy
by **26%**

Assisting tool

1. The independent samples T-Test

➤ Compare the means of mean difference in prediction confidence of the correct and incorrect groups between the BiTNet model and the EfficientNet model.

➤ Hypothesis : The means of mean differences of the BiTNet model were significantly higher than those of EfficientNet.

2. The Paired Samples T-Test

➤ Compare of mean accuracy, precision, and recall of the diagnostic performance of the participants with and without assistance.

➤ Hypothesis : The mean accuracy, precision, and recall scores of the diagnostic performance of the participants with assistance were significantly higher than those without assistance.

➤ Compare of mean accuracy between the first round of the experiment and the second round of the experiment with the participants.

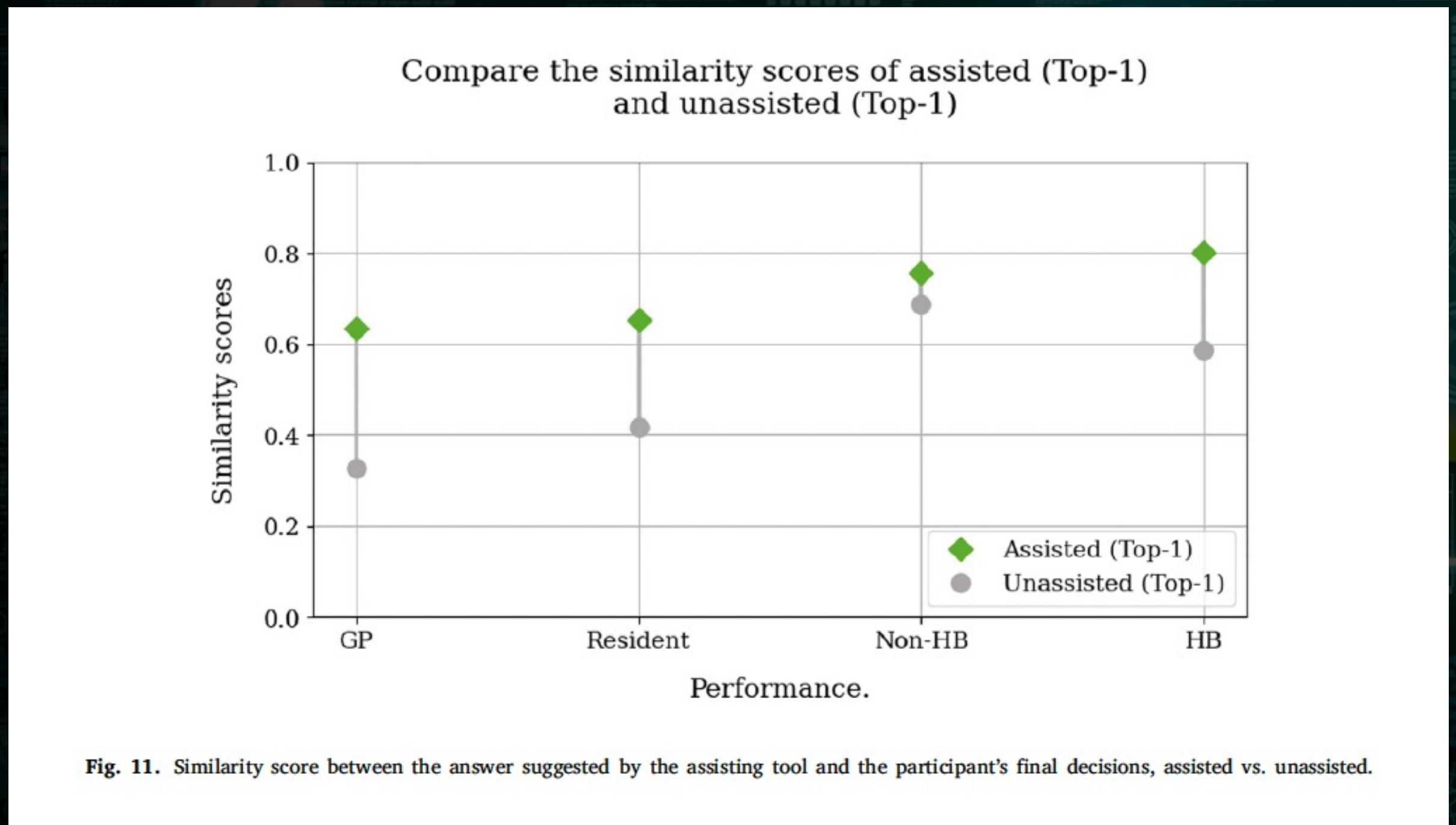
➤ Hypothesis : The mean accuracy scores no significant difference between the first round and the second round of the experiment.

➤ Compare of mean **similarity scores** between **AI suggestion** (prediction) and the final decision of the participants when **assisted/unassisted**.

○ **Hypothesis** : The mean similarity score of the assisted participants was significantly greater than that of the unassisted participants.

Assisting tool

2. The Paired Samples T-Test



- Compare of mean **similarity scores** between **AI suggestion** (prediction) and the final decision of the participants when **assisted/unassisted**.
 - **Hypothesis**: The mean similarity score of the assisted participants was significantly greater than that of the unassisted participants.

