The Daily Telegraph

Section: News
Edition: 01
Date: 29 October 2018
Page: 8

Circulation: 374535
Source: ABC Jul 2018

pressdata

Turing method that cracked Enigma to help in cancer fight

By **Henry Bodkin**

THE method devised by Alan Turing, the Second World War codebreaker, to crack Enigma could be used to detect cancer earlier, experts have said.

Researchers at Edinburgh University believe Turing's mathematical techniques could be used to help measure the effectiveness of existing diagnostic tools.

At present, the accuracy of diagnostic tests is assessed using statistical techniques developed in the 1980s, but the method is unable to gauge how useful a test could be in determining a person's risk of developing a disease.

However, experts at the university's Usher Institute of Population Health Sciences and Informatics believe the tests could be improved by studying Turing's methods.

Working at Bletchley Park during the war, Turing came up with the technique used to break the German Enigma machine. His approach investigated the distribution of so-called weights of evidence – which establish the likely outcomes in a given situation – to help him decide on the best strategy for cracking the code.

Applying the same principle could potentially aid the development of personalised treatments, a study published in the journal *Statistical Methods in Medical Research* has revealed.

Prof Paul McKeigue, of the institute, said: "Most existing diagnostic tests for identifying people at high risk of cancer or heart disease do not come anywhere near the standards we could hope to see.

"The new era of precision medicine is emerging, and this method should make it easier for researchers and regulatory agencies to decide when a new diagnostic test should be used."

THE TIMES

Section: News
Edition: 01
Date: 29 October 2018
Page: 4

Circulation: 430660
Source: ABC Jul 2018

pressdata

Turing's work could help with enigma of cancer detection

Katrine Bussey

Work by the Second World War code-breaker Alan Turing could help to develop better tests for the early detection of cancer and other diseases.

Researchers at the University of Edinburgh believe his mathematical techniques could be used to help to measure the effectiveness of diagnostic tools.

The accuracy of diagnostic tests is assessed using statistical techniques developed in the 1980s, but these are unable to gauge how useful a test could be in determining an individual's risk of developing a disease.

Scientists at the university's Usher Institute of Population Health Sciences and Informatics believe that Turing's methods could improve the techniques.

Turing's mathematical genius played a key role in breaking the Nazi Enigma code. Working at Bletchley Park — Britain's main decryption centre — in Buckinghamshire in 1941, he investigated the distribution of so-called weights of evidence, which establish the likely outcomes in a given situation, to help him to decide the best strategy for cracking codes. Researchers think the same principle could help to develop personalised treatments, a study published in the journal *Statistical Methods in Medical Research* has suggested.

Turing worked out how the weight of evidence was expected to vary over repeated experiments. His ideas were developed further in 1968 and published by his former assistant Jack Good.

Paul McKeigue, a professor of genetic epidemiology at the Usher Institute, said the principle of how the weight of evidence varied could be applied to evaluate the diagnostic tests used for personalised treatments.

He said that most such tests for identifying those at high risk of cancer or heart disease "do not come anywhere near the standards we could hope to see".

He added: "The new era of precision medicine is emerging and this method should make it easier for researchers and regulatory agencies to decide when a new diagnostic test should be used."

INDEPENDENT

Section: News
Edition: 01
Date: 29 October 2018
Page: 15

Circulation: 54984
Source: ABC Apr 2016

pressdata

Enigma variations: Turing's work could help spot cancer

KATRINE BUSSEY

Work by the Second World War codebreaker Alan Turing could help develop better tests for the early detection of cancer and other diseases, according to experts.

Researchers at Edinburgh University believe his mathematical techniques could be used to help measure the effectiveness of existing diagnostic tools.

Currently the accuracy of diagnostic tests is assessed using statistical techniques developed in the 1980s. These are unable to gauge how useful a test could be in determining an individual's risk of developing a disease.

But now experts at the university's Usher Institute of Population Health Sciences and Informatics believe Mr Turing's methods could improve diagnoses. Working at Bletchley Park in 1941, Mr Turing came up with the method used to break the German forces' Enigma code. His approach investigated the distribution of so-called weights of evidence – which establish the likely outcomes in a given situation – to help him decide the best strategy for cracking Enigma.

The same principle could aid the development of personalised treatments, according to research published in the journal Statistical Methods in Medical Research.

Edinburgh professor Paul McKeigue said: "Most existing diagnostic tests for identifying people at high risk of cancer or heart disease do not come anywhere near the standards we could hope to see. The new era of precision medicine is emerging, and this method should make it easier for researchers and regulatory agencies to decide when a new diagnostic test should be used."

INDEPENDENT

Section: News
Edition: 01
Date: 29 October 2018
Page: 15

Circulation: 54984
Source: ABC Apr 2016

pressdata

The codebreaker's strategy can be used with diagnostic tools (Rex)

Section: News
Edition: 01
Date: 29 October 2018
Page: 7
Circulation: 243940
Source: ABC Jul 2018

SCIENCE

How Turing could aid cancer tests

By Katrine Busse

Work by the Second World War codebreaker Alan Turing could help develop better tests for the early detection of cancer and other diseases, according to university experts.

Researchers at Edinburgh University believe his mathematical techniques could be used to help measure the effectiveness of existing diagnostic tools. Turing's approach investigated the distribution of so-called weights of evidence – which establish the likely outcomes in a given situation – to help him decide the best strategy for cracking Enigma. Researchers think applying the same principle could aid the development of personalised treatments, a study published in *Statistical Methods in Medical Research* has revealed.

SCOTTISH DAILY EXPRESS

Section: News
Edition: 01
Date: 29 October 2018
Page: 19

Circulation: 339303
Source: ABC Jul 2018

pressdata

Science that broke Enigma could help catch cancer early

By **Katrine Bussey**

WORK by the Second World War codebreaker Alan Turing could now boost the early detection of cancer and other diseases, Scots scientists have said.

They believe his mathematical techniques could be used to help measure the effectiveness of existing diagnostic tools.

The accuracy of diagnostic tests is currently assessed using statistical techniques developed in the 1980s.

Evidence

But they are unable to gauge how useful a test could be in determining an individual's risk of developing a disease.

But now experts at Edinburgh University's Usher Institute of Population Health Sciences and Informatics believe Turing's methods could improve these.

Working at Bletchley Park in 1941, Turing came up with the method used to break the Nazis' Enigma code. His approach

Wartime codebreaker Alan Turing

investigated the distribution of so-called weights of evidence – which establish the likely outcomes in a given situation – to help him decide the best strategy for cracking Enigma.

Researchers think applying the same principle could help in the development of personalised treatments, a study published in Statistical Methods in Medical research has revealed. Turing worked out how the weight of evidence was expected to vary over repeated experiments. His ideas were developed further in 1968 and published by his former assistant Jack Good.

Professor Paul McKeigue, of the university's Usher Institute of Population Health Sciences and Informatics, said the same principle of how the weight of evidence varies can be applied to evaluate tests used for personalised treatments – making it easier to determine how useful the test is.

Standards

He said: "Most existing diagnostic tests for identifying people at high risk of cancer or heart disease do not come anywhere near the standards we could hope to see.

"The new era of precision medicine is emerging, and this method should make it easier for researchers and regulatory agencies to decide when a new diagnostic test should be used."

The Herald

Section: News
Edition: 01
Date: 29 October 2018
Page: 7

Circulation: 25869
Source: ABC Dec 2017

pressdata

Codebreaker Turing's work could tailor cancer tests

HELEN MCARDLE
HEALTH CORRESPONDENT

WORK carried out by the Second World War codebreaker Alan Turing could help develop better tests for the early detection of cancer and other diseases, according to university experts.

Researchers at Edinburgh University believe his mathematical techniques could be used to help measure the effectiveness of existing diagnostic tools and also predict the effectiveness of drugs in certain patients.

Working at Bletchley Park, Buckinghamshire – the top-secret home of the Second World War codebreakers – in 1941, Turing came up with the method used to break the German forces' Enigma code.

His approach investigated the distribution of so-called weights of evidence, which establish the likely outcomes in a given situation, to help him decide the best strategy for cracking Enigma.

Professor Paul McKeigue, of the university's Usher Institute of Population Health Sciences and Informatics, said the same principle can be applied to evaluate the diagnostic tests used for personalised treatments.

"The advantage of this approach is it allows you to tell how a test will work when it's used in that way to decide what cut-off to use when deciding who should have an investigation like a colonoscopy.

"It makes it easier to work out what will happen if you use this test in something like a cancer screening programme: how many people will it detect as a false positive, and so on.

"The existing methods for evaluating a diagnostic test don't really do that, and especially they are not very good at telling you if you add another test on top of the existing test how much improvement that will be, and if it's worthwhile."

Currently, the accuracy of diagnostic tests is assessed using statistical techniques developed in the 1980s, but these are unable to gauge how useful a test could be in determining an individuals risk of developing a disease.

Turing worked out how the weight of evidence was expected to vary over repeated experiments, with these ideas developed further in 1968 and published by his former assistant Jack Good.

Mr McKeigue added: "What everyone has been talking about in medicine for the past few years is this idea of 'precision medicine' – that we won't just have everybody getting the same treatment if they have a particular disease, but that treatment would be tailored to individuals.

The Herald

Section: News
Edition: 01
Date: 29 October 2018
Page: 7

Circulation: 25869
Source: ABC Dec 2017

pressdata

"For that to work, you need very good ways of predicting how people will respond to drugs. So while there is a lots of research going on in this area at the moment, one of the things holding it back is there is no sensible way to evaluate the tests on which the precision medicine is supposed to depend.

"Our study uses these unpublished results of Turing, which have been largely forgotten since he derived them, and yet they turn out to have practical application in this completely different field."

■ **Study uses Alan Turing's unpublished results.**

THE SCOTSMAN

Section: News
Edition: 01
Date: 29 October 2018
Page: 13

Circulation: 19792
Source: ABC Dec 2017

pressdata

Codebreaker Turing's war work could help to improve medical detection

By **KATRINE BUSSEY**

Work by the Second World War codebreaker Alan Turing could help develop better tests for the early detection of cancer and other diseases, according to university experts.

Researchers at Edinburgh University believe his mathematical techniques could be used to help measure the effectiveness of existing diagnostic tools.

Currently, the accuracy of diagnostic tests is assessed using statistical techniques developed in the 1980s, with these unable to gauge how useful a test could be in determining an individuals risk of developing a disease.

But now specialists at Edinburgh University's Usher Institute of Population Health Sciences and Informatics believe that Turing's methods could improve these.

Working at Bletchley Park in 1941, Turing came up with the method used to break the German forces' Enigma code.

His approach investigated the distribution of so-called weights of evidence – which establish the likely outcomes in a given situation – to help him decide the best strategy for cracking Enigma.

Researchers think that applying the same principle could potentially aid the development of personalised treatments, a study published in Statistical Methods in Medical Research has revealed.

Turing worked out how the weight of evidence was expected to vary over repeated experiments, with these ideas developed further in 1968 and published by his former assistant Jack Good.

Professor Paul McKeigue, of the university's Usher Institute of Population Health Sciences and Informatics, said the same principle of how the weight of evidence varies can be applied to evaluate the diagnostic tests used for personalised treatments.

In this way, the performance of a test can be quantified.

Daily Record

Section: News
Edition: 01
Date: 29 October 2018
Page: 15

Circulation: 124034
Source: ABC Jul 2018

pressdata

Codebreaker could help fight cancer

WORK by World War II codebreaker Alan Turing could help develop better tests for the early detection of cancer and other diseases, say experts.

Edinburgh University researchers believe his mathematical techniques could be used to help measure the effectiveness of existing diagnostic tools.

Professor Paul McKeigue said: "The new era of precision medicine is emerging and this method should make it easier for researchers and regulatory agencies to decide when a new diagnostic test should be used."

GENIUS Alan Turing

INVERNESS, HIGHLANDS & ISLANDS
The D&J
The Press and Journal

Section: News
Edition: 01
Date: 29 October 2018
Page: 22

Circulation: 48208
Source: ABC Dec 2017

pressdata

Turing principle could aid testing

Health: Hopes methods will boost diagnostic tools

BY KATRINE BUSSEY

Work by the Second World War codebreaker Alan Turing could help develop better tests for the early detection of cancer and other diseases, according to university experts.

Researchers at Edinburgh University believe his mathematical techniques could be used to help measure the effectiveness of existing diagnostic tools.

Currently, the accuracy of diagnostic tests is assessed using statistical techniques developed in the 1980s, with these unable to gauge how useful a test could be in determining an individual's risk of developing a disease.

But now experts at the university's Usher Institute of Population Health Sciences and Informatics believe Turing's methods could improve these.

Working at Bletchley Park in 1941, Turing came up with the method used to break the German forces' Enigma code.

His approach investigated the distribution of so-called weights of evidence – which establish the likely outcomes in a given situation – to help him decide the best strategy for cracking Enigma.

Researchers think applying the same principle could potentially aid the development of personalised treatments, a study published in Statistical Methods in Medical research has revealed.

Turing worked out how the weight of evidence was expected to vary over repeated experiments, with these ideas developed further in 1968 and published by his former assistant Jack Good.

Professor Paul McKeigue, of the university's Usher Institute of Population Health Sciences and Informatics, said the same principle of how the weight of evidence varies can be applied to evaluate the diagnostic tests used for personalised treatments.

In this way, the performance of a test can be quantified.

He stated: "The new era of precision medicine is emerging and this method should make it easier for researchers and regulatory agencies to decide when a new diagnostic test should be used."

The D&J
INVERNESS, HIGHLANDS & ISLANDS
The Press and Journal

Section: News
Edition: 01
Date: 29 October 2018
Page: 22

Circulation: 48208
Source: ABC Dec 2017

pressdata

CODEBREAKER: Researchers believe Alan Turing's work could improve testing for diseases such as cancer

Western Daily Press

Section: News
Edition: 01
Date: 29 October 2018
Page: 4,5

Circulation: 15544
Source: ABC Jan 2017

pressdata

Turing's work could improve cancer tests

KATRINE BUSSEY
news@westerndailypress.co.uk

WORK by West Country codebreaker Alan Turing could help develop better tests for the early detection of cancer and other diseases, according to university experts.

Researchers at Edinburgh University believe his mathematical techniques could be used to help measure the effectiveness of existing diagnostic tools.

Currently the accuracy of diagnostic tests is assessed using statistical techniques developed in the 1980s, with these unable to gauge how useful a test could be in determining an individuals risk of developing a disease.

But now experts at the university believe the methods developed by Turing, who went to Sherborne School in Dorset, could improve these.

Working at Bletchley Park during the Second World War, Turing came up with the method used to break the German forces' Enigma code.

His approach investigated the distribution of so-called weights of evidence, which establish the likely outcomes in a given situation, to help him decide the best strategy for cracking Enigma.

Researchers think applying the same principle could potentially aid the development of personalised treatments, a study published in *Statistical Methods in Medical Research* has revealed.

Turing, *pictured*, worked out how the weight of evidence was expected to vary over repeated experiments, with these ideas developed further in 1968 and published by his former assistant Jack Good.

Professor Paul McKeigue said the same principle of how the weight of evidence varies can be applied to evaluate the diagnostic tests used for personalised treatments.

In this way, the performance of a test can be quantified.

He stated: "Most existing diagnostic tests for identifying people at high risk of cancer or heart disease do not come anywhere near the standards we could hope to see. The new era of precision medicine is emerging, and this method should make it easier for researchers and regulatory agencies to decide when a new diagnostic test should be used."

Western Daily Press

Section: News
Edition: 01
Date: 29 October 2018
Page: 4,5

Circulation: 15544
Source: ABC Jan 2017

pressdata

Western Daily Press

Section: News
Edition: 01
Date: 29 October 2018
Page: 4,5

Circulation: 15544
Source: ABC Jan 2017

pressdata

Western Daily Press

Section: News
Edition: 01
Date: 29 October 2018
Page: 4,5

Circulation: 15544
Source: ABC Jan 2017

pressdata

> All the colour of carnival came to Warminster in Wiltshire on Saturday night when crowds thronged the streets to see the annual cavalcade. Photographer Clare Green was there to capture the atmosphere.

YORKSHIRE POST

Section: News
Edition: 01
Date: 29 October 2018
Page: 2

Circulation: 21817
Source: ABC Dec 2017

pressdata

Codebreaker Turing's methods 'could improve medical testing'

WORK BY the Second World War codebreaker Alan Turing could help develop better tests for the early detection of cancer and other diseases, according to university experts.

Researchers at Edinburgh University believe his mathematical techniques could be used to help measure the effectiveness of existing diagnostic tools. Currently the accuracy of diagnostic tests is assessed using statistical techniques developed in the 1980s, with these unable to gauge how useful a test could be in determining an individual's risk of developing a disease.

But now experts at the University's Usher Institute of Population Health Sciences and Informatics believe Turing's methods could improve these. Working at Bletchley Park in 1941, Turing came up with the method used to break the German forces' Enigma code.

ALAN TURING: Mathematical techniques could be used to assess the effectiveness of diagnostic tests.

His approach investigated the distribution of so-called weights of evidence – which establish the likely outcomes in a given situation – to help him decide the best strategy for cracking Enigma.

Researchers think applying the same principle could aid the development of personalised treatments, a study in Statistical Methods in Medical research has revealed. Turing worked out how the weight of evidence was expected to vary over repeated experiments, with these ideas developed further in 1968 and published by his former assistant Jack Good.

Professor Paul McKeigue, of the university, said the same principle of how the weight of evidence varies can be applied to evaluate the diagnostic tests used for personalised treatments.

In this way, the performance of a test can be quantified. He stated: "Most existing diagnostic tests for identifying people at high risk of cancer or heart disease do not come anywhere near the standards we could hope to see. The new era of precision medicine is emerging, and this method should make it easier for researchers and regulatory agencies to decide when a new diagnostic test should be used."