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What is the news?

- As part of the 'Interdisciplinary Group for Advanced Research on Birth Outcomes – DBT India Initiative' (GARBH-Ini) programme, researchers at **IIT Madras and Translational Health Science and Technology Institute (THSTI), Faridabad**, developed the **first India-specific Artificial Intelligence (AI)** model to accurately determine a foetus's age in the second and third trimesters.

What is the name of this AI Model?

- Garbhini-GA2

What is Artificial intelligence (AI)?

- Artificial intelligence (AI) is a field of science that involves creating machines and computers that can learn, reason, and act in ways that would normally require human intelligence.

A blessing for expecting mothers: AI Predicts Indian Women's Foetal Age More Accurately:

- Indian researchers developed an AI-powered technique to determine foetal age in pregnant women, advancing pregnancy care. This IIT Madras-THSTI collaboration could enhance pregnancy

outcomes for millions of Indian women.

Why India Needs AI-powered Foetal Age Estimation?

Ultrasound images and fundal height measurements are used to assess foetal age. However, these methods have limitations:

In India, the traditional methods for estimating foetal age have limitations that can negatively impact pregnancy care:

- Currently, the age of a foetus (‘Gestational Age’ or GA) is determined using a formula developed for Western population.
- They are likely to be erroneous when applied in the later part of pregnancy due to variations in the growth of the foetus in the Indian population.
- Ultrasound Scans: While widely used, ultrasound interpretations can be subjective, with accuracy varying based on the healthcare provider’s experience. Early scans might not provide enough definitive features for accurate age determination.
- Fundal Height Measurement: This method involves measuring the distance from the pubic bone to the top of the uterus. However, it becomes less reliable in later trimesters, particularly for women with a higher Body Mass Index (BMI), leading to potential miscalculations.
- The newly developed ‘Garbhini-GA2’ accurately estimates the age of a foetus for the Indian

population, reducing error by almost three times.

- This GA model can improve the care delivered by obstetricians and neonatologists, thus reducing maternal and infant mortality rates in India.

Challenges in India:

- Socioeconomic Disparities: Rural areas generally lack advanced ultrasound technology, resulting in inaccurate foetal age estimation for a large section of the population.
- India has high mother and newborn mortality due to pregnancy complications. Accurate foetal age measurement can help discover issues early and intervene.

The Promise of AI-powered Foetal Age Estimation:

The new AI model, "Garbhini-GA2," uses AI to overcome these constraints. How it works:

- Data-Driven Learning: Garbhini-GA2 learns from a massive ultrasound picture and clinical data collection of Indian women. This lets it find correlations between measures and gestational age.
- Better Accuracy: The AI model estimates foetal age more accurately than traditional approaches by analysing several parameters.
- Reduced Subjectivity: AI eliminates human

subjectivity, which may improve healthcare provider results.
- The AI model might be implemented into portable ultrasound machines or smartphone apps, making it accessible in rural areas.

Benefits for Mothers and Babies:

AI-based foetal age assessment can improve Indian pregnancy outcomes:

- Early Intervention and Management: Early detection of growth issues or developmental delays allows for better management.
- Optimal Care: Based on foetal age, healthcare experts can create prenatal care strategies to support mother and baby throughout pregnancy.
- Greater precision in estimating the due date might reduce anxiety and stress for pregnant mothers.
- AI-powered foetal age assessment could revolutionise pregnancy care in India, especially in rural regions and for high-BMI women. This technique may improve maternal and newborn health.

Road Ahead:

- Garbhini-GA2 is a major advance, however more research is needed:
  - Validation: The model must be validated with larger and more diverse datasets to work across

populations.

- Integration: The AI model must be integrated into healthcare infrastructure and trained on its use for wider adoption.
- Ethical Considerations: Data privacy and equitable access to this technology in urban and rural areas are crucial.

Conclusion:

- The AI-powered foetal age estimation algorithm created by IIT Madras and THSTI revolutionises prenatal care in India. This technology could improve pregnancy outcomes and ensure a better future for Indian moms and babies by boosting accuracy, reducing subjectivity, and possibly expanding accessibility.

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General Studies

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- After Attempting Last Question.
- Enter Name & Email
- Click on - Check Result
- Scroll down - Check out Solutions too.

Thank you.

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Category: **General Studies**

Traditional methods for estimating foetal age in India can be less accurate due to:

○ The widespread availability of advanced ultrasound technology.

○ The subjectivity involved in interpreting ultrasound scans.

○ The universal applicability of formulas developed for Western populations.

○ The lack of trained healthcare professionals in rural areas.

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Category: **General Studies**

A challenge associated with wider adoption of AI-powered foetal age estimation in India includes:

○ The universally high level of digital literacy among pregnant women.

○ The potential for bias based on a woman's socioeconomic background in the training data.

○ The immediate availability of the technology in all healthcare facilities.

○ The complete absence of qualified personnel to operate the AI model.

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Category: **General Studies**

The AI model Garbhini-GA2 aims to improve foetal age estimation in India by:

○ Replacing the need for ultrasound scans altogether.

○ Utilizing a vast dataset of medical records from Western countries.

○ Leveraging artificial intelligence to analyze ultrasound data from Indian women.

○ Focusing solely on the measurement of a woman's fundal height.

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Category: **General Studies**

A potential benefit of AI-powered foetal age estimation for Indian mothers is:

○ Reduced reliance on experienced healthcare professionals for interpretation.

○ Elimination of the need for prenatal check-ups during pregnancy.

○ Increased likelihood of complications during childbirth.

○ Confirmation of the baby's sex during the early stages of pregnancy.

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Category: **General Studies**

The development of an India-specific AI model for foetal age estimation is significant because it:

○ Eliminates the need for any physical examinations during pregnancy.

○ Offers the potential for more accurate age estimation for Indian women.

○ Provides a one-size-fits-all solution for all pregnant women globally.

○ Makes ultrasound scans completely obsolete for pregnancy monitoring.

Prev Finish

Check Rank, Result Now and enter correct email as you will get Solutions in the email as well for future use!

Check the Result

Your score is

0%

Restart quiz

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Mains Questions:

Question 1:

Explain the limitations of traditional methods for foetal age estimation in India. How can AI-powered models like Garbhini-GA2 address these limitations and improve pregnancy outcomes? (250 words)

Model Answer:

Limitations of Traditional Methods:

- Ultrasound Scans: Subjectivity in interpretation based on experience, limited information in early scans.
- Fundal Height Measurement: Inaccuracy in later trimesters and for women with higher BMI.
- Limited Accessibility: Advanced ultrasound technology might not be readily available in rural areas.

Advantages of AI-powered Model (Garbhini-GA2):

- Improved Accuracy: Analyzes multiple ultrasound parameters and leverages India-specific data for more precise age estimation.
- Reduced Subjectivity: Removes human bias, leading to consistent results across healthcare providers.
- Potential for Increased Accessibility: Integration with portable devices or smartphone apps could improve access in resource-limited settings.

Improved Pregnancy Outcomes:

- Early Detection of Issues: Timely identification of potential growth problems or developmental delays.
- Optimum Care: Tailored prenatal care plans based on accurate foetal age.
- Reduced Anxiety: Knowing the estimated due date with greater accuracy can alleviate stress for mothers.

Question 2:

Discuss the significance of developing an India-specific AI model for foetal age estimation. How can challenges like data privacy and ethical considerations be addressed for wider adoption of this technology? (250 words)

Model Answer:

Significance of India-specific Model:

- Accounts for Variations: Considers potential differences in foetal growth patterns and nutritional factors compared to Western populations.
- Enhanced Reliability: Reduces bias from formulas derived from Western data, leading to more accurate estimations for Indian women.

Challenges and Considerations:

- Data Privacy: Ensuring data security and privacy of the mothers and babies involved in the training dataset is crucial.
  Ethical Considerations: Equitable access to the technology in both urban and rural settings needs to be addressed.
- Training and Integration: Training healthcare providers on using the AI model and integrating it into existing healthcare infrastructure is essential.

By addressing these challenges, India can unlock the full potential of AI-powered foetal age estimation for improved pregnancy care across the nation.

Remember: These are just sample answers. It's important to further research and refine your responses based on your own understanding and perspective.

Relevance to the UPSC Prelims and Mains syllabus under the following topics:

Prelims:

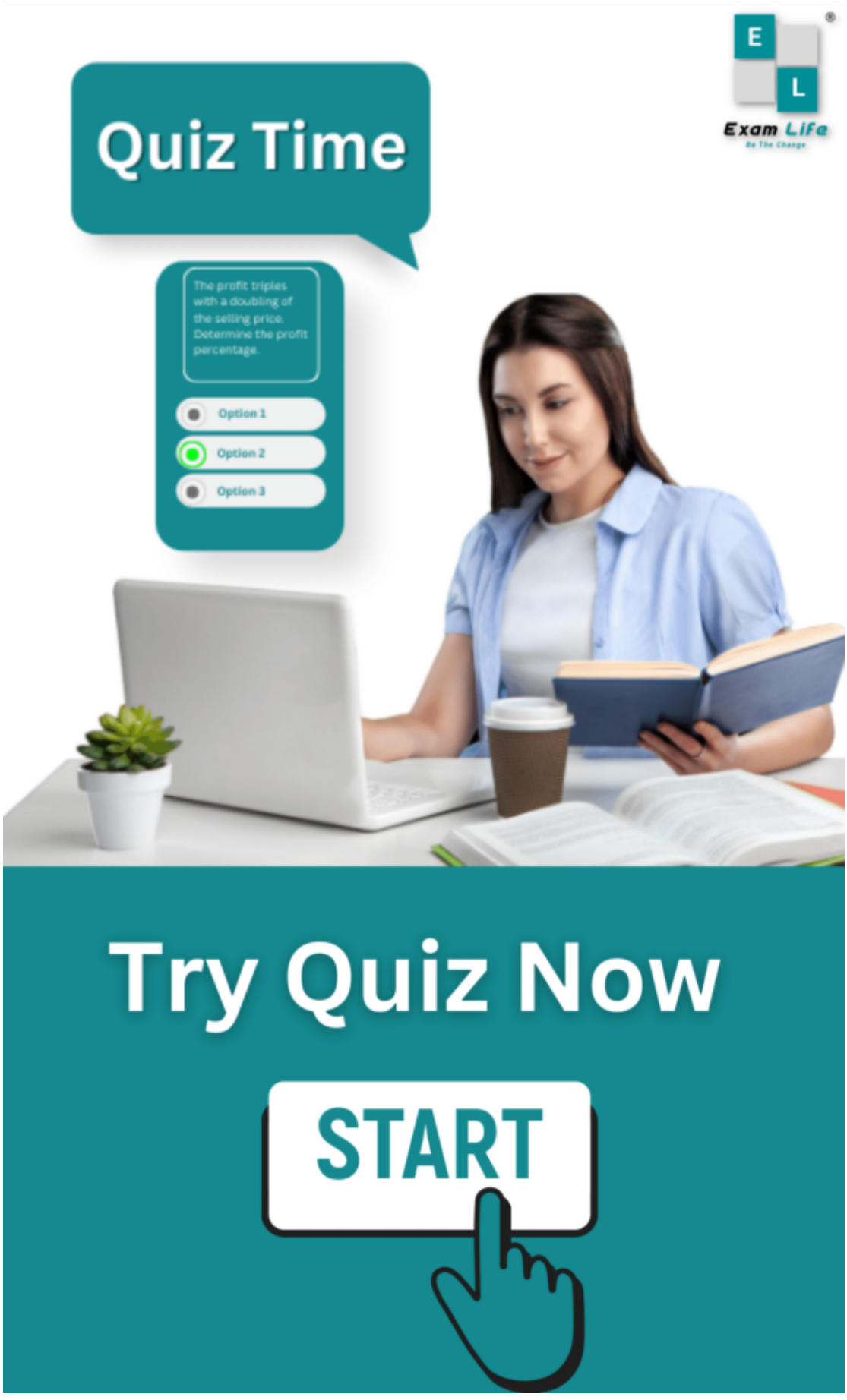
- **GS 1(Science & Technology):** While not directly tested, a basic understanding of AI principles and its potential applications in healthcare can be beneficial in the Science & Technology section of the GS1 paper.

Mains:

- **GS Paper II (Governance, Constitution, Public Policy):** Here, the connection is more prominent. You can discuss the topic under various headings:
  Science & Technology in the service of the nation and their impacts on the economy and environment: AI-powered foetal age estimation represents an advancement in healthcare technology with the potential to improve maternal and infant health outcomes. Discussing its potential benefits and challenges showcases

your understanding of science and technology's role in national development.

Issues related to Health & Family Welfare: This topic allows you to discuss AI in healthcare and its potential impact on improving access to quality prenatal care, particularly in rural areas. You can mention limitations of traditional methods and how AI can address those limitations.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