

AUTOMATED MCQ GENERATOR

AI-Powered Multiple Choice Question Generation from Educational Text using NLP and Transformer Models

PROBLEM STATMENT

Creating high-quality multiple-choice questions from educational content is time-consuming and requires significant effort from educators

WORKFLOW

📄 Input Text → 🔍 Extract Entities

🔍 Entities → ❓ Generate Questions

❓ Questions → 🎲 Create Distractors

🎲 Distractors → ✅ Final MCQs

KEY FEATURES

- Automatic extraction of key concepts and entities from text
- Context-aware question generation using T5 transformer
- Intelligent distractor creation for plausible wrong answers
- User-friendly web interface for easy access
- Supports various educational domains and subjects

BENEFITS & IMPACT

- Consistency: Ensures uniform question quality
- Scalability: Handles large volumes of content
- Accessibility: Empowers educators with limited resources

MY SOLUTION

An automated system that generates relevant, well-structured MCQs from any textbook passage using advanced NLP techniques.

- **Question Generation:** T5-based model with highlight mechanism
- **Answer Extraction:** SpaCy NER and noun phrase chunking
- **Distractor Generation:** Semantic similarity using sentence embeddings
- **User Interface:** Gradio web application

IMPLEMENTATION

Model Selection:
Valhalla T5-base-qg-hl for highlight-based question generation provides superior contextual understanding.

NLP Pipeline:
SpaCy processes text for named entity recognition and syntactic analysis.

Embedding Model:
Sentence-transformers enable semantic similarity matching for distractor generation.

text

The human circulatory system is a complex network responsible for transporting blood, nutrients, oxygen, and hormones throughout the body. The heart is a muscular organ that pumps blood through the body continuously. Blood vessels include arteries, veins, and capillaries, each serving distinct functions. Arteries carry oxygen-rich blood away from the heart to various tissues and organs. The aorta is the largest artery in the human body, originating directly from the left ventricle of the heart. Veins transport deoxygenated blood back to the heart, with the exception of pulmonary veins which carry oxygenated blood. Capillaries are tiny blood vessels where the exchange of oxygen, nutrients, and waste products occurs between blood and tissues. Red blood cells contain hemoglobin, a protein that binds to oxygen and gives blood its red color. White blood cells are part of the immune system and help fight infections and diseases. Platelets are small cell fragments that play a crucial role in blood clotting and wound healing. Plasma is the liquid component of blood, making up about 55 percent of total blood volume. The cardiovascular system works closely with the respiratory system to ensure adequate oxygen supply to all body cells. Blood pressure is the force exerted by blood against the walls of blood vessels, measured in millimeters of mercury. Hypertension, or high blood pressure, is a common condition that can lead to serious health complications if left untreated. The sinoatrial node, often called the heart's natural pacemaker, generates electrical impulses that regulate heartbeat rhythm. Exercise and proper nutrition are essential for maintaining a healthy circulatory system throughout life.

Q1: The circulatory system transports blood, nutrients, oxygen, and what else throughout the body?
A. Hypertension
B. hormones
C. wound
D. oxygen
Answer: hormones

Q2: What is the role of the heart?
A. hemoglobin
B. that
C. Plasma
D. arteries
Answer: that

Q3: Along with arteries, capillaries and veins, what other type of blood vessel serves a different function?
A. capillaries
B. life
C. veins

text

The human circulatory system is a complex network responsible for transporting blood, nutrients, oxygen, and hormones throughout the body. The heart is a muscular organ that pumps blood through the body continuously. Blood vessels include arteries, veins, and capillaries, each serving distinct functions. Arteries carry oxygen-rich blood away from the heart to various tissues and organs. The aorta is the largest artery in the human body, originating directly from the left ventricle of the heart. Veins transport deoxygenated blood back to the heart, with the exception of pulmonary veins which carry oxygenated blood. Capillaries are tiny blood vessels where the exchange of oxygen, nutrients, and waste products occurs between blood and tissues. Red blood cells contain hemoglobin, a protein that binds to oxygen and gives blood its red color. White blood cells are part of the immune system and help fight infections and diseases. Platelets are small cell fragments that play a crucial role in blood clotting and wound healing. Plasma is the liquid component of blood, making up about 55 percent of total blood volume. The cardiovascular system works closely with the respiratory system to ensure adequate oxygen supply to all body cells. Blood pressure is the force exerted by blood against the walls of blood vessels, measured in millimeters of mercury. Hypertension, or high blood pressure, is a common condition that can lead to serious health complications if left untreated. The sinoatrial node, often called the heart's natural pacemaker, generates electrical impulses that regulate heartbeat rhythm. Exercise and proper nutrition are essential for maintaining a healthy circulatory system throughout life.

Q4: Arteries carry oxygen-rich blood away from the heart to various tissues and what else?
A. organs
B. nutrients
C. mercury
D. Exercise
Answer: organs

Q5: What veins carry oxygenated blood back to the heart?
A. Exercise
B. mercury
C. which
D. Veins
Answer: which

Q6: What are tiny blood vessels called?
A. organs
B. life
C. hemoglobin
D. Capillaries
Answer: Capillaries

Q7: What is hemoglobin?
A. Veins
B. blood
C. that
D. Diastole

Clear Submit

FUTURE ENHANCEMENTS

Difficulty Levels

Implement adaptive difficulty scaling based on Bloom's taxonomy

Multi-language Support

Extend to generate questions in multiple languages

Feedback Loop

Incorporate teacher feedback to improve question quality

Integration

API development for LMS integration (Moodle, Canvas)