

AP Computer Science Principles | Unit 5

5.1 Computing Innovations

Solutions

Reference scenario

Analyze a bus-arrival prediction app as a computing innovation.

Inputs: vehicle locations and route data

Processing: arrival estimates

Output: estimated wait time

Users: passengers

5.1.1

For an automatic captioning tool, identify input, computational function, output, and one user benefit.

Input is audio. The tool computes a text transcription or caption sequence. Output is displayed captions. A benefit is improved access to spoken content for users who need text.

5.1.2

Name one harmful effect of inaccurate captions and a mitigation.

Errors may distort important instructions or exclude users. Allow corrections, provide access to the original content, and test accuracy across speakers and environments.

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5.2 Privacy and Security Impacts

Solutions

Reference scenario

Assess whether attendance tracking needs continuous location collection.

Goal: record class attendance

Proposal: continuous precise location

Alternative: class-specific check-in

Retention: not yet specified

5.2.1

What is data minimization in this scenario?

Collect and retain only the information needed to record attendance, rather than unrelated continuous location history.

5.2.2

Why should a privacy review consider sharing partners and retention as well as the initial collection?

Later access, combination, reuse, or storage can create risks not apparent when the data was first collected. The full data lifecycle affects exposure.

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5.3 Bias, Equity, and Accessibility

Solutions

Reference scenario

Review a speech interface tested only with one group of speakers.

Test group: 20 speakers with similar accents

Deployment: broad school population

Keyboard alternative: absent

5.3.1

Give an accessibility improvement for a chart that conveys categories only by color.

Add readable labels, patterns, or a text/table alternative so the distinction does not depend only on color perception.

5.3.2

Why can an overall average accuracy hide unequal outcomes?

A large well-served group can dominate the average while smaller groups experience high error rates. Review disaggregated results with appropriate privacy safeguards.

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5.4 Intellectual Property and Digital Citizenship

Solutions

Reference scenario

A student finds a public image without a visible reuse license. Decide what public access establishes.

Image: viewable online

Reuse permission: unknown

Proposed use: redistribute inside an app

5.4.1

Why is attribution alone not enough to authorize every reuse of a copyrighted image?

Credit identifies the source but does not replace required permission or override license restrictions. The permitted use depends on the applicable rights and terms.

5.4.2

Contrast public-domain material with open-source code under a license.

Public-domain material generally lacks the relevant copyright restriction. Open-source code is licensed under terms that can require notices, attribution, or other conditions; inspect the specific license.

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5.5 Responsible Computing Decisions

Solutions

Reference scenario

Propose a transparent classroom policy for an AI-supported study tool.

Benefit: immediate practice feedback

Risk: incorrect answers and sensitive submissions

Need: student explanation and teacher review

5.5.1

Name two questions to ask before deploying a student recommendation system.

Examples: what data is necessary, how recommendations are evaluated across users, who can challenge an error, who can access records, and when records are deleted.

5.5.2

Why is a clear appeal or correction path useful for an automated recommendation?

It lets affected people report mistakes and provides accountability when a rule or data record produces an inappropriate outcome. Automation does not remove responsibility for reviewing consequences.