

OCR COMPUTER SCIENCE NEA

OCR COMPUTER SCIENCE NEA IS AN INCREASINGLY POPULAR TOPIC AMONG STUDENTS PREPARING FOR THEIR COMPUTER SCIENCE COURSEWORK, ESPECIALLY WHEN IT COMES TO THE NEA (NON-EXAM ASSESSMENT). AS PART OF THE OCR (OXFORD, CAMBRIDGE AND RSA EXAMINATIONS) CURRICULUM, UNDERSTANDING OCR COMPUTER SCIENCE NEA IS ESSENTIAL FOR STUDENTS AIMING TO EXCEL IN THEIR COURSEWORK AND SECURE TOP GRADES. THIS COMPREHENSIVE GUIDE WILL DELVE INTO WHAT OCR COMPUTER SCIENCE NEA ENTAILS, HOW TO APPROACH IT EFFECTIVELY, AND TIPS FOR SUCCESS, ENSURING STUDENTS ARE WELL-EQUIPPED TO MANAGE THEIR PROJECT WITH CONFIDENCE.

UNDERSTANDING OCR COMPUTER SCIENCE NEA

WHAT IS OCR COMPUTER SCIENCE NEA?

THE OCR COMPUTER SCIENCE NEA IS A SIGNIFICANT COMPONENT OF THE A-LEVEL QUALIFICATION, DESIGNED TO ASSESS STUDENTS' ABILITY TO APPLY THEIR PROGRAMMING SKILLS IN A PRACTICAL PROJECT. UNLIKE TRADITIONAL EXAMS, THE NEA INVOLVES STUDENTS DEVELOPING A SOFTWARE SOLUTION TO A REAL-WORLD PROBLEM, DEMONSTRATING THEIR UNDERSTANDING OF COMPUTER SCIENCE PRINCIPLES IN A PRACTICAL CONTEXT.

THE NEA TYPICALLY REQUIRES STUDENTS TO:

- ANALYZE A PROBLEM OR NEED.
- DESIGN AN APPROPRIATE SOLUTION.
- IMPLEMENT THE SOLUTION USING PROGRAMMING LANGUAGES SUCH AS PYTHON, JAVA, OR C++.
- TEST AND EVALUATE THEIR SOFTWARE.
- DOCUMENT THEIR PROCESS COMPREHENSIVELY.

WHY IS OCR COMPUTER SCIENCE NEA IMPORTANT?

THE NEA ACCOUNTS FOR A SUBSTANTIAL PORTION OF THE OVERALL GRADE, EMPHASIZING PRACTICAL SKILLS OVER THEORETICAL KNOWLEDGE. IT PROMOTES:

- PROBLEM-SOLVING ABILITIES.
- PROGRAMMING PROFICIENCY.
- ANALYTICAL THINKING.
- PROJECT MANAGEMENT SKILLS.
- CLEAR DOCUMENTATION AND COMMUNICATION.

COMPLETING A SUCCESSFUL NEA NOT ONLY BOOSTS YOUR GRADE BUT ALSO PREPARES YOU FOR FUTURE ACADEMIC PURSUITS OR CAREERS IN SOFTWARE DEVELOPMENT AND TECHNOLOGY.

KEY COMPONENTS OF THE OCR COMPUTER SCIENCE NEA

1. THE CONTEXT AND PROBLEM SPECIFICATION

THIS INITIAL STAGE INVOLVES IDENTIFYING A REAL-WORLD PROBLEM OR NEED. STUDENTS SHOULD:

- CONDUCT RESEARCH TO UNDERSTAND THE PROBLEM.
- DEFINE THE SCOPE AND OBJECTIVES.
- GATHER USER REQUIREMENTS.

EFFECTIVE PROBLEM SPECIFICATION IS CRUCIAL FOR GUIDING THE SUBSEQUENT DESIGN AND DEVELOPMENT PHASES.

2. DESIGNING THE SOLUTION

DESIGNING INVOLVES PLANNING HOW THE SOFTWARE WILL FUNCTION:

- CREATING FLOWCHARTS OR UML DIAGRAMS.
- PLANNING THE USER INTERFACE AND USER EXPERIENCE.
- DESIGNING DATA STRUCTURES AND ALGORITHMS NEEDED.
- CONSIDERING CONSTRAINTS AND LIMITATIONS.

A WELL-THOUGHT-OUT DESIGN MINIMIZES ISSUES DURING IMPLEMENTATION.

3. IMPLEMENTATION

THIS IS THE CODING PHASE WHERE STUDENTS DEVELOP THEIR SOFTWARE BASED ON THE DESIGN:

- WRITING CLEAN, EFFICIENT, AND WELL-DOCUMENTED CODE.
- USING VERSION CONTROL SYSTEMS LIKE GIT.
- REGULARLY TESTING MODULES DURING DEVELOPMENT.

CHOOSING THE RIGHT PROGRAMMING LANGUAGE SUITED FOR THE PROJECT IS ESSENTIAL.

4. TESTING AND EVALUATION

TESTING ENSURES THE SOFTWARE FUNCTIONS CORRECTLY:

- CONDUCTING UNIT TESTS ON INDIVIDUAL COMPONENTS.
- PERFORMING INTEGRATION TESTS ON THE ENTIRE SYSTEM.
- GATHERING USER FEEDBACK.
- MAKING NECESSARY REVISIONS.

EVALUATION INVOLVES REFLECTING ON THE PROJECT'S SUCCESS AND AREAS FOR IMPROVEMENT.

5. DOCUMENTATION AND REFLECTION

THOROUGH DOCUMENTATION COVERS:

- PLANNING AND DESIGN DECISIONS.
- IMPLEMENTATION PROCESS.
- TESTING PROCEDURES AND RESULTS.
- PERSONAL REFLECTION ON CHALLENGES FACED AND SKILLS GAINED.

CLEAR DOCUMENTATION DEMONSTRATES UNDERSTANDING AND PROFESSIONALISM.

APPROACHING THE OCR COMPUTER SCIENCE NEA EFFECTIVELY

1. PLANNING AND TIME MANAGEMENT

CREATING A DETAILED PROJECT PLAN WITH TIMELINES HELPS ENSURE STEADY PROGRESS. BREAK DOWN TASKS INTO MANAGEABLE PHASES:

- RESEARCH AND PROBLEM DEFINITION.
- DESIGN.

- DEVELOPMENT.
- TESTING.
- FINAL DOCUMENTATION.

UTILIZE TOOLS LIKE GANTT CHARTS OR PROJECT MANAGEMENT APPS TO STAY ORGANIZED.

2. CHOOSING THE RIGHT PROBLEM

SELECT A PROJECT THAT ALIGNS WITH YOUR INTERESTS AND SKILLS:

- ENSURE IT HAS A CLEAR SCOPE.
- IS FEASIBLE WITHIN AVAILABLE RESOURCES AND TIME.
- OFFERS SCOPE FOR DEMONSTRATING A RANGE OF SKILLS.

EXAMPLES INCLUDE DEVELOPING A SIMPLE INVENTORY SYSTEM, A QUIZ APP, OR A DATA ANALYSIS TOOL.

3. FOCUS ON QUALITY OVER QUANTITY

AIM FOR A FUNCTIONAL, WELL-DOCUMENTED PROJECT RATHER THAN A COMPLEX BUT POORLY IMPLEMENTED ONE. PRIORITIZE:

- CLEAN CODE.
- USER-FRIENDLY INTERFACES.
- ROBUST TESTING.

QUALITY PROJECTS TEND TO SCORE HIGHER IN ASSESSMENT.

4. REGULARLY SEEK FEEDBACK

CONSULT TEACHERS OR PEERS DURING DEVELOPMENT TO IDENTIFY POTENTIAL ISSUES EARLY. USE THEIR INSIGHTS TO REFINE YOUR PROJECT.

5. KEEP A DEVELOPMENT LOG

MAINTAIN A RECORD OF YOUR PROGRESS, DECISIONS MADE, CHALLENGES FACED, AND HOW YOU OVERCAME THEM. THIS DOCUMENTATION CAN BE INVALUABLE DURING THE FINAL WRITE-UP.

TIPS FOR SUCCESS IN OCR COMPUTER SCIENCE NEA

- **START EARLY:** ALLOW AMPLE TIME FOR EACH PHASE, FROM RESEARCH TO TESTING.
- **UNDERSTAND THE ASSESSMENT CRITERIA:** FAMILIARIZE YOURSELF WITH THE MARKING SCHEME TO FOCUS ON KEY AREAS LIKE FUNCTIONALITY, DOCUMENTATION, AND EVALUATION.
- **USE VERSION CONTROL:** TOOLS LIKE GIT HELP TRACK CHANGES AND COLLABORATE EFFECTIVELY.
- **TEST THOROUGHLY:** ENSURE YOUR SOFTWARE HANDLES VARIOUS INPUTS AND EDGE CASES.
- **DOCUMENT CLEARLY:** WRITE DETAILED EXPLANATIONS FOR YOUR DESIGN DECISIONS AND CODING CHOICES.
- **REFLECT HONESTLY:** BE GENUINE ABOUT CHALLENGES AND LEARNING EXPERIENCES IN YOUR EVALUATION.

RESOURCES AND SUPPORT FOR OCR COMPUTER SCIENCE NEA

ONLINE TUTORIALS AND FORUMS

WEBSITES LIKE STACK OVERFLOW, GITHUB, AND PROGRAMMING TUTORIALS ON PLATFORMS SUCH AS CODECADEMY OR KHAN ACADEMY CAN BE INVALUABLE.

OCR SPECIFICATION AND PAST PAPERS

REVIEW THE OFFICIAL OCR NEA GUIDELINES AND EXEMPLAR PROJECTS TO UNDERSTAND EXPECTATIONS.

TEACHER AND PEER SUPPORT

REGULARLY CONSULT WITH TEACHERS FOR GUIDANCE AND FEEDBACK. COLLABORATE WITH CLASSMATES FOR BRAINSTORMING AND TROUBLESHOOTING.

TOOLS AND SOFTWARE

- IDEs LIKE VISUAL STUDIO CODE, PYCHARM, OR ECLIPSE.
- DIAGRAMMING TOOLS SUCH AS DRAW.IO OR LUCIDCHART.
- DOCUMENT EDITORS LIKE MICROSOFT WORD OR GOOGLE DOCS.

CONCLUSION

MASTERING THE OCR COMPUTER SCIENCE NEA REQUIRES CAREFUL PLANNING, TECHNICAL PROFICIENCY, AND METICULOUS DOCUMENTATION. BY UNDERSTANDING EACH COMPONENT OF THE PROJECT, ADOPTING EFFECTIVE STRATEGIES, AND LEVERAGING AVAILABLE RESOURCES, STUDENTS CAN PRODUCE HIGH-QUALITY WORK THAT DEMONSTRATES THEIR SKILLS AND KNOWLEDGE. REMEMBER, THE NEA IS NOT JUST ABOUT COMPLETING A PROJECT BUT ABOUT SHOWCASING YOUR ABILITY TO SOLVE REAL-WORLD PROBLEMS THROUGH COMPUTER SCIENCE PRINCIPLES. WITH DEDICATION AND STRATEGIC EFFORT, SUCCESS IN OCR COMPUTER SCIENCE NEA IS WELL WITHIN REACH.

KEYWORDS: OCR COMPUTER SCIENCE NEA, NEA PROJECT, PROGRAMMING, SOFTWARE DEVELOPMENT, PROJECT PLANNING, COMPUTER SCIENCE COURSEWORK, OCR A-LEVEL, PROBLEM-SOLVING, CODING, TESTING, DOCUMENTATION.

FREQUENTLY ASKED QUESTIONS

WHAT IS OCR AND HOW IS IT RELEVANT FOR NEA IN COMPUTER SCIENCE?

OCR (OPTICAL CHARACTER RECOGNITION) IS A TECHNOLOGY THAT CONVERTS IMAGES OF HANDWRITTEN OR PRINTED TEXT INTO MACHINE-READABLE TEXT. IN THE NEA (NON-EXAM ASSESSMENT) FOR COMPUTER SCIENCE, OCR CAN BE RELEVANT FOR PROJECTS INVOLVING TEXT DIGITIZATION, DATA EXTRACTION, OR AUTOMATION TASKS THAT REQUIRE RECOGNIZING AND PROCESSING TEXTUAL DATA FROM IMAGES.

How can I incorporate OCR technology into my NEA project?

You can integrate OCR into your NEA project by using libraries like Tesseract OCR, which allows you to develop applications that recognize and extract text from images. Ensure to explain how OCR works, the steps involved, and demonstrate practical implementation within your project to show technical understanding.

What are common challenges faced when implementing OCR in NEA projects?

Common challenges include dealing with poor image quality, handwriting recognition accuracy, language and font variations, and processing speed. Addressing these issues may involve image preprocessing, choosing suitable OCR models, and fine-tuning parameters to improve accuracy.

Are there any ethical considerations when using OCR in NEA projects?

Yes, ethical considerations include ensuring data privacy and security, especially if processing sensitive or personal information. It's important to use OCR responsibly, obtain necessary permissions, and comply with data protection regulations when handling textual data extracted from images.

What skills should I develop to effectively implement OCR for my NEA in Computer Science?

You should develop skills in programming (e.g., Python), understanding of image processing techniques, familiarity with OCR libraries like Tesseract, and knowledge of data cleaning and preprocessing. Additionally, problem-solving and debugging skills are essential for optimizing OCR performance in your project.

Additional Resources

OCR Computer Science NEA: An In-Depth Investigation into Optical Character Recognition for Computer Science Practical Assessments

Introduction

Optical Character Recognition (OCR) has become an integral component of modern computer science applications, bridging the gap between scanned physical documents and machine-readable digital data. As part of the Computer Science Non-Exam Assessment (NEA) in many curricula, OCR projects challenge students to explore the nuances of image processing, pattern recognition, and machine learning. This comprehensive review aims to dissect the role of OCR within the NEA framework, examining its technical foundations, pedagogical value, common challenges, and future prospects.

Understanding OCR in the Context of Computer Science NEA

What is OCR?

Optical Character Recognition (OCR) is a technology that converts images of typed, handwritten, or printed text into machine-encoded text. This process involves multiple complex steps, including image preprocessing, character segmentation, feature extraction, and classification.

Significance in the NEA

In the context of the Computer Science NEA, OCR serves as both a practical project focus and a means to demonstrate understanding of key concepts such as algorithms, data structures, and machine learning. Students often develop their own OCR systems or improve existing ones, providing a rich platform for applied

LEARNING.

TECHNICAL FOUNDATIONS OF OCR

KEY COMPONENTS OF OCR SYSTEMS

A TYPICAL OCR SYSTEM COMPRISES SEVERAL INTERCONNECTED MODULES:

- IMAGE ACQUISITION: SCANNING OR CAPTURING THE DOCUMENT IMAGE.
- PREPROCESSING: ENHANCING IMAGE QUALITY THROUGH NOISE REDUCTION, BINARIZATION, AND SKEW CORRECTION.
- SEGMENTATION: DIVIDING THE IMAGE INTO TEXT LINES, WORDS, AND INDIVIDUAL CHARACTERS.
- FEATURE EXTRACTION: IDENTIFYING DISTINCTIVE FEATURES OF CHARACTERS, SUCH AS STROKES, LOOPS, OR INTERSECTIONS.
- CLASSIFICATION: ASSIGNING CHARACTERS BASED ON FEATURES, OFTEN EMPLOYING MACHINE LEARNING ALGORITHMS.
- POST-PROCESSING: CORRECTING ERRORS USING DICTIONARIES OR CONTEXT-BASED ANALYSIS.

ALGORITHMS AND TECHNIQUES

IMAGE PROCESSING TECHNIQUES

- THRESHOLDING: CONVERTS GRAYSCALE IMAGES TO BINARY TO DISTINGUISH TEXT FROM BACKGROUND.
- MORPHOLOGICAL OPERATIONS: REMOVE NOISE AND FILL GAPS IN CHARACTERS.
- CONNECTED COMPONENT ANALYSIS: DETECTS AND ISOLATES CHARACTERS FOR FURTHER PROCESSING.

CHARACTER RECOGNITION METHODS

- TEMPLATE MATCHING: COMPARES INPUT IMAGES TO STORED TEMPLATES.
- STATISTICAL CLASSIFIERS: USES ALGORITHMS LIKE K-NEAREST NEIGHBORS (K-NN) OR NAIVE BAYES.
- MACHINE LEARNING APPROACHES: EMPLOYS NEURAL NETWORKS, ESPECIALLY CONVOLUTIONAL NEURAL NETWORKS (CNNs), FOR HIGH ACCURACY IN COMPLEX SCENARIOS.

OCR IMPLEMENTATION IN THE NEA: PEDAGOGICAL APPROACH AND BEST PRACTICES

PROJECT PLANNING AND SCOPE

STUDENTS SHOULD DEFINE A CLEAR SCOPE, SUCH AS:

- RECOGNIZING DIGITS OR SPECIFIC ALPHABETS.
- HANDLING HANDWRITTEN OR PRINTED TEXT.
- FOCUSING ON SPECIFIC FONTS OR LANGUAGES.

DATA COLLECTION

EFFECTIVE OCR HINGES ON QUALITY DATASETS. STUDENTS MAY:

- USE EXISTING DATASETS LIKE MNIST (HANDWRITTEN DIGITS).
- COLLECT THEIR OWN IMAGES FOR CUSTOM APPLICATIONS.
- AUGMENT DATA WITH NOISE, DISTORTION, OR VARIED FONTS TO IMPROVE ROBUSTNESS.

DEVELOPMENT WORKFLOW

A TYPICAL WORKFLOW INCLUDES:

1. DATA ACQUISITION & PREPROCESSING
2. SEGMENTATION
3. FEATURE EXTRACTION

4. TRAINING CLASSIFIER
5. TESTING & EVALUATION
6. OPTIMIZATION & DEPLOYMENT

TOOLS AND LIBRARIES

- OPENCV: FOR IMAGE PROCESSING TASKS.
- TENSORFLOW/KERAS: FOR TRAINING NEURAL NETWORKS.
- TESSERACT OCR: AN OPEN-SOURCE OCR ENGINE FOR BASELINE COMPARISONS.

EVALUATION METRICS

- ACCURACY: PERCENTAGE OF CORRECTLY RECOGNIZED CHARACTERS.
- PRECISION AND RECALL: ESPECIALLY RELEVANT IN HANDWRITTEN OR NOISY DATA.
- PROCESSING SPEED: CRITICAL FOR REAL-TIME APPLICATIONS.

COMMON CHALLENGES AND SOLUTIONS IN OCR NEA PROJECTS

IMAGE QUALITY AND NOISE

POOR IMAGE QUALITY CAN SIGNIFICANTLY IMPAIR RECOGNITION ACCURACY. STUDENTS SHOULD EMPLOY PREPROCESSING TECHNIQUES SUCH AS:

- ADAPTIVE THRESHOLDING.
- DENOISING FILTERS.
- DESKEWING ALGORITHMS.

CHARACTER SEGMENTATION DIFFICULTIES

CONNECTED OR OVERLAPPING CHARACTERS POSE SEGMENTATION CHALLENGES. SOLUTIONS INCLUDE:

- CONTOUR ANALYSIS.
- WATERSHED ALGORITHMS.
- DYNAMIC PROGRAMMING METHODS.

VARIABILITY IN FONTS AND HANDWRITING

DIVERSE FONTS AND HANDWRITING STYLES REQUIRE EXTENSIVE TRAINING DATA AND ADAPTABLE MODELS. STRATEGIES INVOLVE:

- DATA AUGMENTATION.
- TRANSFER LEARNING.
- USE OF ROBUST CLASSIFIERS LIKE CNNs.

LANGUAGE AND CHARACTER SET LIMITATIONS

PROJECTS FOCUSING ON NON-LATIN SCRIPTS OR SPECIAL CHARACTERS NEED SPECIALIZED DATASETS AND TAILORED FEATURE EXTRACTION METHODS.

ETHICAL AND ACCESSIBILITY CONSIDERATIONS

ENSURING OCR SYSTEMS ARE INCLUSIVE AND ACCESSIBLE, INCLUDING CONSIDERATIONS FOR DIVERSE SCRIPTS AND DISABILITIES, ENHANCES THE SOCIETAL IMPACT OF THE PROJECT.

CASE STUDIES: SUCCESSFUL OCR NEA PROJECTS

CASE STUDY 1: RECOGNIZING HANDWRITTEN DIGITS USING CNNs

STUDENTS DEVELOPED A CNN-BASED OCR SYSTEM TRAINED ON THE MNIST DATASET. ACHIEVEMENTS INCLUDED:

- ACHIEVING OVER 98% ACCURACY.
- IMPLEMENTING REAL-TIME RECOGNITION.
- DEMONSTRATING UNDERSTANDING OF DEEP LEARNING PRINCIPLES.

CASE STUDY 2: LICENSE PLATE RECOGNITION SYSTEM

UTILIZING IMAGE PROCESSING AND MACHINE LEARNING, STUDENTS CREATED A SYSTEM CAPABLE OF:

- DETECTING LICENSE PLATES IN IMAGES.
- SEGMENTING CHARACTERS.
- RECOGNIZING ALPHANUMERIC CHARACTERS FOR SECURITY APPLICATIONS.

CASE STUDY 3: MULTI-LANGUAGE OCR FOR DOCUMENT DIGITIZATION

A PROJECT AIMED AT RECOGNIZING TEXT IN MULTIPLE LANGUAGES, INVOLVING:

- MULTILINGUAL DATASETS.
- LANGUAGE DETECTION ALGORITHMS.
- CUSTOM TRAINING FOR NON-LATIN SCRIPTS.

FUTURE DIRECTIONS AND EMERGING TRENDS

DEEP LEARNING AND OCR

THE ADVENT OF DEEP LEARNING, PARTICULARLY CNNs AND TRANSFORMER MODELS, HAS REVOLUTIONIZED OCR ACCURACY AND VERSATILITY. FUTURE PROJECTS CAN EXPLORE:

- END-TO-END OCR SYSTEMS.
- TRANSFER LEARNING FOR LOW-RESOURCE LANGUAGES.
- MULTIMODAL RECOGNITION COMBINING SPEECH AND TEXT.

INTEGRATION WITH OTHER TECHNOLOGIES

- NATURAL LANGUAGE PROCESSING (NLP): FOR CONTEXT-AWARE CORRECTION.
- EDGE COMPUTING: FOR REAL-TIME, ON-DEVICE RECOGNITION.
- MOBILE OCR APPLICATIONS: DEVELOPING LIGHTWEIGHT SYSTEMS FOR SMARTPHONES.

ETHICAL AI AND DATA PRIVACY

WITH INCREASING RELIANCE ON OCR FOR SENSITIVE DATA, FUTURE DEVELOPMENTS SHOULD PRIORITIZE:

- DATA PRIVACY.
- BIAS MITIGATION.
- EXPLAINABILITY OF RECOGNITION DECISIONS.

CONCLUSION

OCR COMPUTER SCIENCE NEA PROJECTS SERVE AS A COMPREHENSIVE PLATFORM FOR STUDENTS TO DELVE INTO THE INTRICACIES OF IMAGE PROCESSING, PATTERN RECOGNITION, AND MACHINE LEARNING. BY NAVIGATING THE TECHNICAL CHALLENGES, EMPLOYING BEST PRACTICES, AND UNDERSTANDING EMERGING TRENDS, STUDENTS NOT ONLY FULFILL ACADEMIC REQUIREMENTS BUT ALSO GAIN VALUABLE SKILLS APPLICABLE TO DIVERSE REAL-WORLD APPLICATIONS. AS OCR TECHNOLOGY

CONTINUES TO EVOLVE, FUTURE NEA ENDEAVORS CAN PUSH THE BOUNDARIES OF INNOVATION, CONTRIBUTING TO MORE ACCESSIBLE, ACCURATE, AND INTELLIGENT TEXT RECOGNITION SYSTEMS.

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THIS ARTICLE AIMS TO PROVIDE A THOROUGH UNDERSTANDING OF OCR IN THE CONTEXT OF COMPUTER SCIENCE NEA PROJECTS, SERVING AS BOTH A GUIDE AND A SOURCE OF INSPIRATION FOR ASPIRING DEVELOPERS AND RESEARCHERS.

Ocr Computer Science Nea

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ocr computer science nea: Teaching Computing in Secondary Schools William Lau, 2017-09-22 This book provides a step-by-step guide to teaching computing at secondary level. It offers an entire framework for planning and delivering the curriculum and shows you how to create a supportive environment for students in which all can enjoy computing. The focus throughout is on giving students the opportunity to think, program, build and create with confidence and imagination, transforming them from users to creators of technology. In each chapter, detailed research and teaching theory is combined with resources to aid the practitioner, including case studies, planning templates and schemes of work that can be easily adapted. The book is split into three key parts: planning, delivery, and leadership and management, and covers topics such as: curriculum and assessment design lesson planning cognitive science behind learning computing pedagogy and instructional principles mastery learning in computing how to develop students' computational thinking supporting students with special educational needs and disabilities encouraging more girls to study computing actions, habits and routines of effective computing teachers behaviour management and developing a strong classroom culture how to support and lead members of your team. Teaching Computing in Secondary Schools is essential reading for trainee and practising teachers, and will prove to be an invaluable resource in helping teaching professionals ensure that students acquire a wide range of computing skills which will support them in whatever career they choose.

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First exams: Summer 2017 Strengthen your students' understanding and upgrade their confidence and exam skills with our OCR Computer Science workbooks, full of self-contained exercises to consolidate knowledge and exam practice questions to improve performance. Written by an experienced Computer Science author, these full colour workbooks provide stimulus materials on all AS and A-level topics, followed by sets of questions designed to develop and test skills in the unit. · Thoroughly prepares students for t.

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