

CSE299 - Complex Engineering Problem (CEP) & Activity (CEA) Mapping

Table 8.3.2.7.1: Attributes of the CEP of your Deepfake Detection Project

Attribute	Addressing the complex engineering problems (P) in the project
P1: Depth of knowledge required (K3-K8)	The project requires knowledge of Artificial Intelligence, deep learning (K8), computer vision and signal processing (K6), CNNs and RNNs (K8), Python (K3), and data science (K3).
P2: Range of conflicting requirements	Early detection of deepfakes is required for rapid response and mitigation of damage. However, the system must also be able to handle large volumes of data and maintain high accuracy in detection.
P3: Depth of analysis required	The project requires a deep understanding of the underlying mechanisms of deepfakes, including the use of generative models and the ability to detect subtle differences in audio and video signals.
P4: Familiarity of issues	The project involves the use of complex engineering concepts, such as deep learning, computer vision, and signal processing, which may be unfamiliar to some students.
P5: Extent of applicable codes	The project involves the use of various codes, including Python, TensorFlow, and OpenCV, which are used to implement the deep learning models and the data processing pipeline.
P6: Extent of stakeholder involvement	The project involves the participation of multiple stakeholders, including students, faculty, and industry experts, who are involved in the design, development, and evaluation of the system.
P7: Interdependence	The project involves the integration of multiple components, including the data collection, model training, and deployment, which are all interdependent and must be carefully managed to ensure the success of the project.

Table 8.3.2.7.2: Attributes of the CEA of your Deepfake Detection Project

Attribute	Addressing the complex engineering activities (A) in the project
A1: Range of resources	The project uses machine learning frameworks (TensorFlow, PyTorch), video and audio datasets (CelebA, VGGFace2, DeepfakeAudio), and a cloud platform (AWS) for training and deployment.
A2: Level of interactions	The project involves the interaction between the data collection, model training, and deployment activities, which are all interdependent and must be carefully managed to ensure the success of the project.
A3: Innovation	The project involves the use of innovative techniques, such as the use of generative models and the ability to detect subtle differences in audio and video signals, which are not typically found in traditional deepfake detection methods.
A4: Consequences to society/Environment	The project has the potential to have significant consequences for society, including the ability to detect and prevent the spread of deepfakes, which can be used for malicious purposes.
A5: Familiarity	The project involves the use of complex engineering concepts, such as deep learning, computer vision, and signal processing, which may be unfamiliar to some students.