

Roadmap

for 2bEngineers Team's project

Project name: "Optimizer for evolutionary generated frame structures"

Basic information	
Team name	2bEngineers
Team leader	Sławomir Klimowski
Members	1. Joanna Baczewska 2. Paweł Bielecki
Project name	Optimizer for evolutionary generated frame structures
Project characteristic	Problem solving via Artificial Intelligence Algorithms

Detailed Project Characteristic	
Main description	<p>Project is concentrated around usage of the Artificial Neural Networks as a problem solving and optimizing algorithms. Project will consist of standalone modules which will divide code into functional parts. To achieve higher efficiency every team member will be responsible for one section. Doing so there will be limited waiting time and it will allow for flexible working hours. Project's modules:</p> <ol style="list-style-type: none">1. User Interface – module will be implemented by Joanna Baczewska and will consists of two parts (User Input Side – this will be responsible for preparing the problem to solve by program; User Output Side – this will create a graphical representation of the solution for given problem)2. Physics engine - implemented by Paweł Bielecki and will handle all required calculations and simulation processes of the program3. AI architecture - implemented by Sławomir Klimowski and will consist of various functions necessary for the process of building and altering the ANN.
Description of version Alpha	<p>Version Alpha is to be minimalistic version of the final product, will consist of simplified interface and have limited capabilities. Version Alpha's modules' implemented functionalities:</p> <ol style="list-style-type: none">1. Command prompt/Terminal interface for defining problem2D Plot of final structure presenting position of every joint and color-coded connection types2. Engine capable of calculations of gravity, angular forces and determining breaking point of the material as also stress limits3. Creation of proposal solution and small alteration to the structure.
Description of version Beta	<p>Version Beta is to be functional version of the product with limited cosmetic functionality and standardized problem parameters such as materials list, gap distance.</p>

	Version Beta's modules' implemented functionalities: <ol style="list-style-type: none"> 1. Web based interface with 2D graphical representation of the solution 2. Engine capabilities extended to calculate elasticity of the materials 3. Extensive structure altering in order to find the best solution for given problem
Description of version 1.0	Version 1.0 is to be the full version of the project implementing: <ol style="list-style-type: none"> 1. 2.5D graphical presentation of the solution 2. Ability to simulate in real time chosen solution meaning not only the final 3. Advanced problem definition such as range of the budget, weight, materials list
Future possibilities	Project uses only simplified representation of the real-world problems and can be improved. Functionality that could be implemented: <ol style="list-style-type: none"> 1. Materials bending and deforming 2. Extend structure to 3D 3. Extra rotation axes 4. Shape of the connection 5. Collisions

Work schedule	
Time arrangements	Separation of the project into functional modules allows for flexible work process. Every member will work at his/her own pace. There are expected regular meeting held every two weeks to summarize progress done and adjust work schedule based on team performance.
Estimated time of completion of version Alpha	Version Alpha should be completed by the end of November, expecting 10 to 12 hours of work per module
Estimated time of completion of version Beta	Version Beta should be completed before Winter Break, expecting 15 to 20 hours of work per module
Estimated time of completion of version 1.0	Version Alpha should be completed by the end of semester, expecting 18 to 22 hours of work per module

Technologies involved into the project	
Numpy	Module used mainly by physics engine
Scikit-learn	AI models used by problem solving algorithms
Matplotlib	Module used in version Alpha to present a solution
Django	Main GUI for full version