

Research Papers on 'Valo'

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Paper 1:

VALO: A Versatile Anytime Framework for LiDAR-based Object Detection Deep Neural Networks

Date: 2024-09-17

Time: 20:30:35

Authors:

Ahmet Soyyigit, Shuochao Yao, Heechul Yun

Summary:

- This work addresses the challenge of adapting dynamic deadline requirements for LiDAR object detection deep neural networks (DNNs). The computing latency of object detection is critically important to ensure safe and efficient navigation. However, state-of-the-art LiDAR object detection DNNs often exhibit significant latency, hindering their real-time performance on resource-constrained edge platforms. Therefore, a tradeoff between detection accuracy and latency should be dynamically managed at runtime to achieve optimum results. In this paper, we introduce VALO (Versatile Anytime algorithm for LiDAR Object detection), a novel data-centric approach that enables anytime computing of 3D LiDAR object detection DNNs. VALO employs a deadline-aware scheduler to selectively process input regions, making execution time and accuracy tradeoffs without architectural modifications. Additionally, it leverages efficient forecasting of past detection results to mitigate possible loss of accuracy due to partial processing of input. Finally, it utilizes a novel input reduction technique within its detection heads to significantly accelerate execution without sacrificing accuracy. We implement VALO on state-of-the-art 3D LiDAR object detection networks, namely CenterPoint and VoxelNext, and demonstrate its dynamic adaptability to a wide range of time constraints while achieving higher accuracy than the prior state-of-the-art. Code is available at <https://github.com/CSL-KU/VALO>.

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Paper 2:

On the thermodynamic foundations of plasticity

Date: 2014-08-18

Time: 01:04:07

Authors:

Ván Péter

Summary:

- In this work the relation of plastic and rheological material models is analysed in the framework of non-equilibrium thermodynamics. After a short summary of the basic notions of classical elasticity and plasticity the traditional thermodynamic treatment of plasticity by Ziegler is introduced, where the plastic deformation is an internal variable, leading to the reduction of thermostatic stress. Then a simple thermodynamic treatment of static and dynamic friction follows, because the continuum generalization of these phenomena leads to viscosity and plasticity in our interpretation. Finally, plasticity is treated in the framework of non-equilibrium thermodynamics. The yield condition is the consequence of the dependence of the Onsagerian conductivity coefficients on the absolute value of the strain rate.

Our treatment unifies rheology and plasticity in a common framework.

--- Ebben az irásban a keplekeny es a reologiai anyagmodellek kapcsolatat tárgyaljuk a nemegyensulyi termodinamika alapjan. A klasszikus rugalmassagtól és keplekenysegétől alapfogalmainak rövid összefoglalása után részletesen vizsgáljuk a Ziegler-tól eredő termodinamikai keplekenysegelmeletet, amelyben a keplekeny deformáció a termosztatikai feszültséget csökkentő belső változó. Ezután a csuszási és tapadási surlódás egyszerű modelljét tárgyaljuk, mert esetünkben ezeknek a kontinuumokra történő általánosítása vezet a viszkozitáshoz, illetve a keplekenyseghez. A keplekenysegi feltételt az Onsager-fele vezetési együtthatóknak a belső változó sebességének abszolút értékétől való függése hordozza. A keplekeny és a rugalmas deformáció időbeli változását reologiai hatásokkal együtt tárgyaljuk. (arXiv egyelőre nem tud ekezeteket a kivonatban.)

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