My Recent Work

Qian Sitian

2018/7/25

Outline

Parameter Fitting

- Preview
- Parameters to Obserables
- Obserables to Parameters

Preview

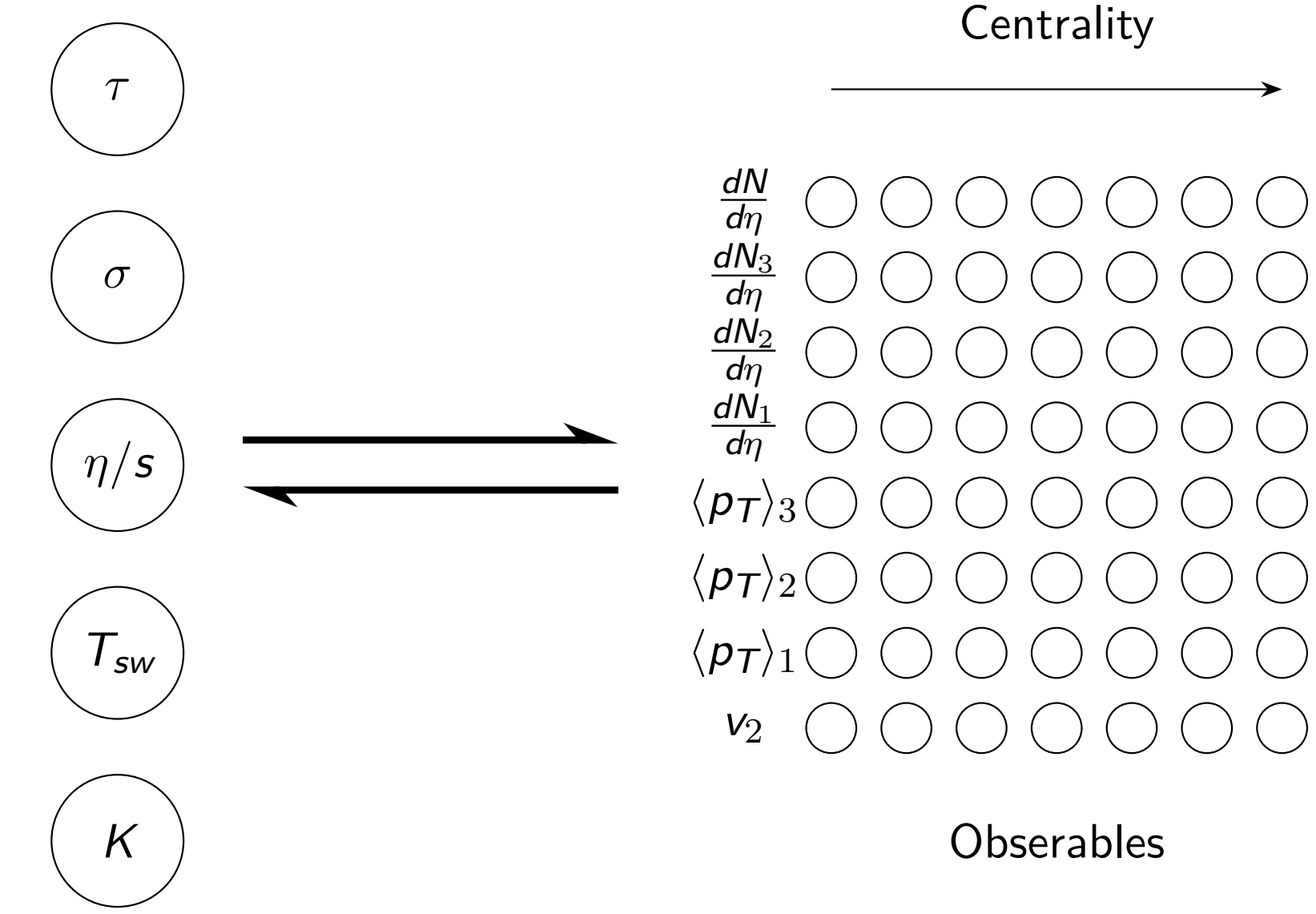
- Basic Information
- Target
- Data

Basic Information

Basic Information

- Model:
  Collective ow in 2.76 A TeV and 5.02 A TeV Pb+Pb collisions
  Arxiv:1703.10792
- Motivation:
  Applying Bayesian parameter estimation to relativistic heavy-ion collisions: simultaneous characterization of the initial state and quark-gluon plasma medium
  Arxiv:1605.03954

Target


Centrality
τ
σ
η/s
T_{sw}
K
$\frac{dN}{d\eta}$
$\frac{dN_3}{d\eta}$
$\frac{dN_2}{d\eta}$
$\frac{dN_1}{d\eta}$
$\langle p_T \rangle_3$
$\langle p_T \rangle_2$
$\langle p_T \rangle_1$
v_2
Parameters
Obserables

Data

- Initial:

τ	σ	η/s	T_{sw}	K
0.2	0.2	0.02	0.15	0.4
0.6	0.6	0.08	0.24	0.8
0.9	1.0	0.12	0.4	1.2

- Divide:

$$Total: 3^5 = 243 \Rightarrow \begin{cases} Train: 220 \\ Test: 23 \end{cases}$$

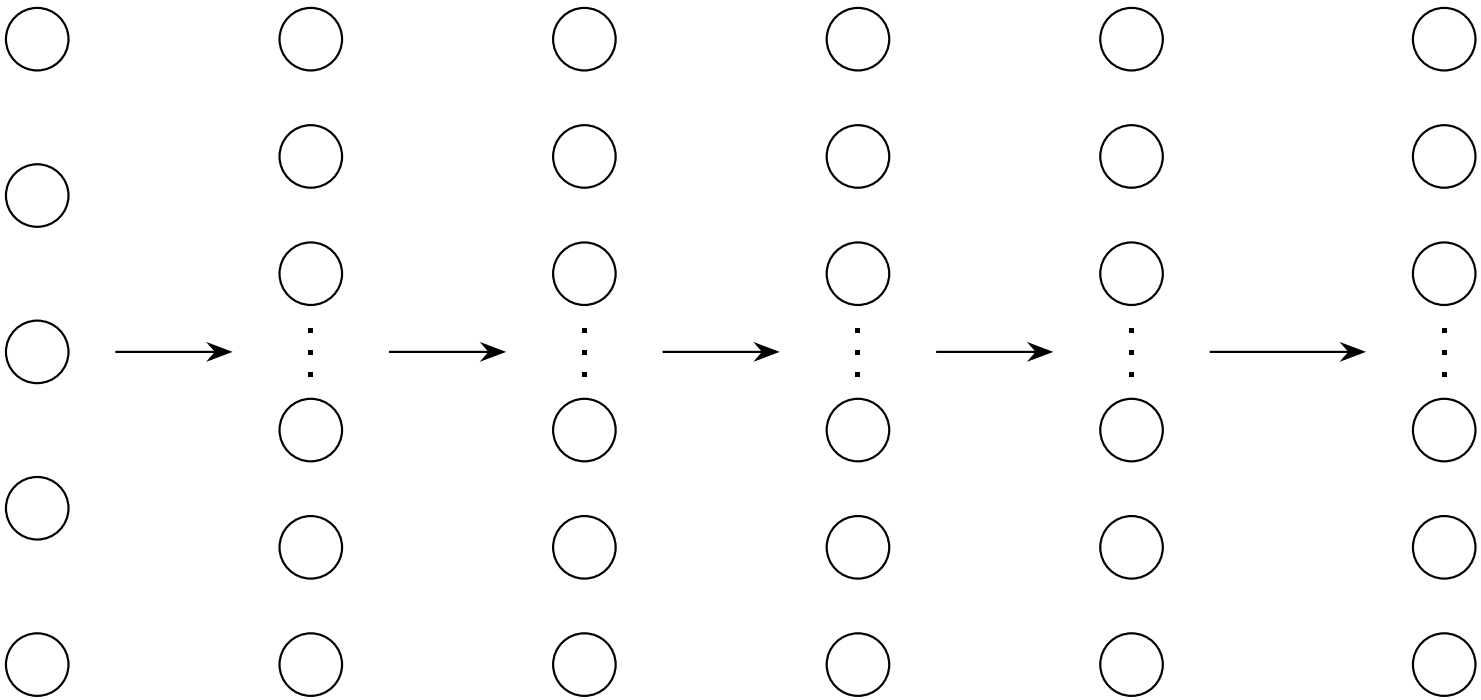
Parameters to Obserables

- Network
- Result

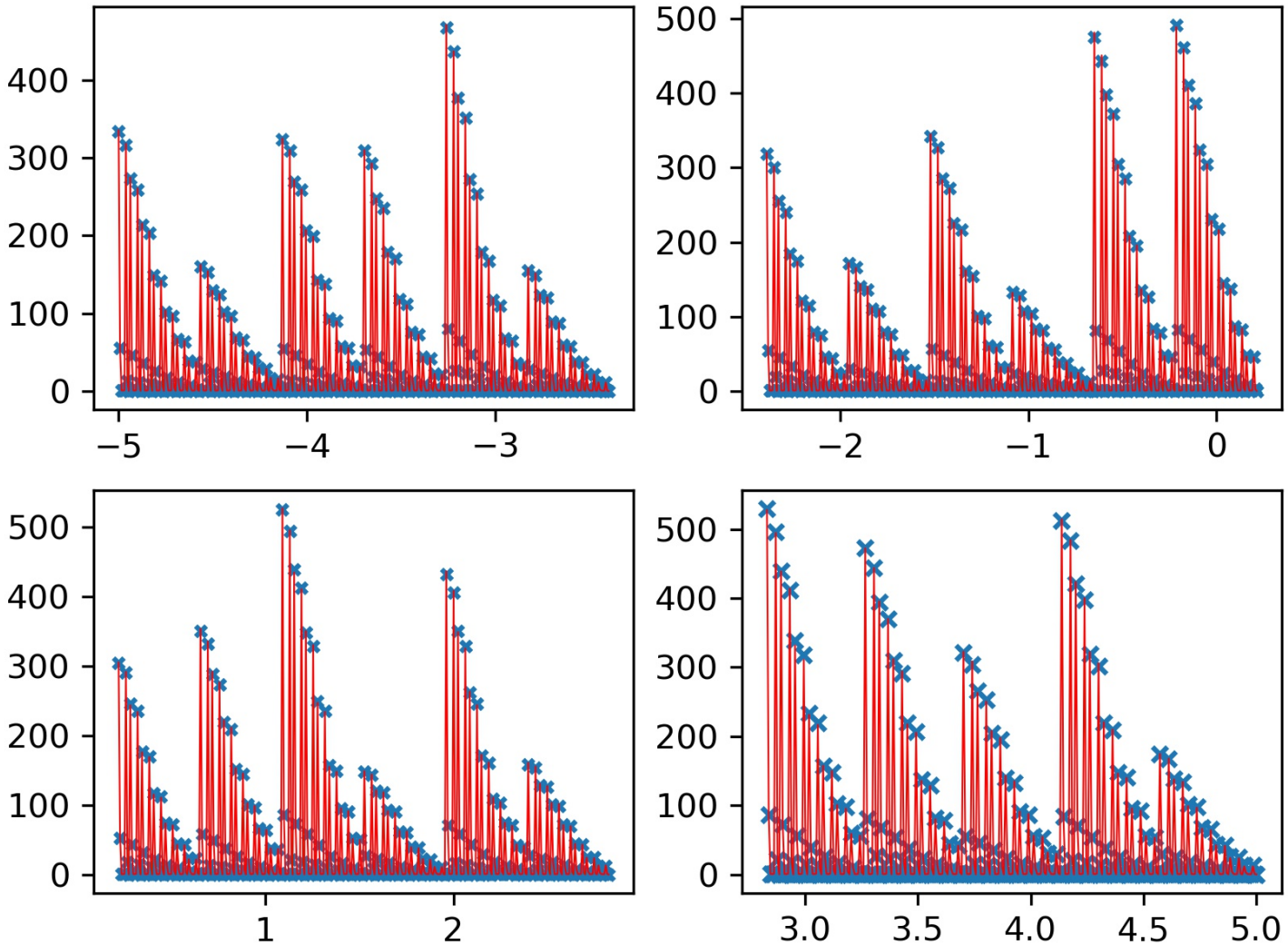
Network

- Optimizer:Adam
- Learning rate:0.0005
- Loss:The L2 norm of the absolute error between the predictions and the labels
- Batch size:Randomly choose 44 of 220
- Layers' type:FC with dropout(p=0.5),activation function:relu
- Training times:200000

Network


Parameter
128 units
128 units
128 units
128 units
Obserables

Result


400
300
200
100
0
−5
−4
−3
500
400
300
200
100
0
−2
−1
0
500
400
300
200
100
0
1
2
500
400
300
200
100
0
3.0
3.5
4.0
4.5
5.0

Result:Relative Error

表: Relative Error

Obs \ Ctr	2.5%	7.5%	15%	25%	35%	45%	55%
$\frac{dN}{d\eta}$	0.01	0.01	0.01	0.01	0.02	0.02	0.04
$\frac{dN_1}{d\eta}$	0.02	0.02	0.03	0.03	0.03	0.05	0.05
$\langle p_T \rangle_1$	0.04	0.02	0.04	0.04	0.06	0.05	0.05
$\langle p_T \rangle_2$	0.04	0.05	0.03	0.03	0.05	0.04	0.04
$\langle p_T \rangle_3$	0.02	0.08	0.03	0.04	0.09	0.10	0.16
$\frac{dN_2}{d\eta}$	0.01	0.01	0.01	0.01	0.02	0.02	0.04
$\frac{dN_3}{d\eta}$	0.03	0.05	0.04	0.04	0.06	0.07	0.13
v_2	1.17	1.34	0.63	0.72	0.94	0.36	1.18

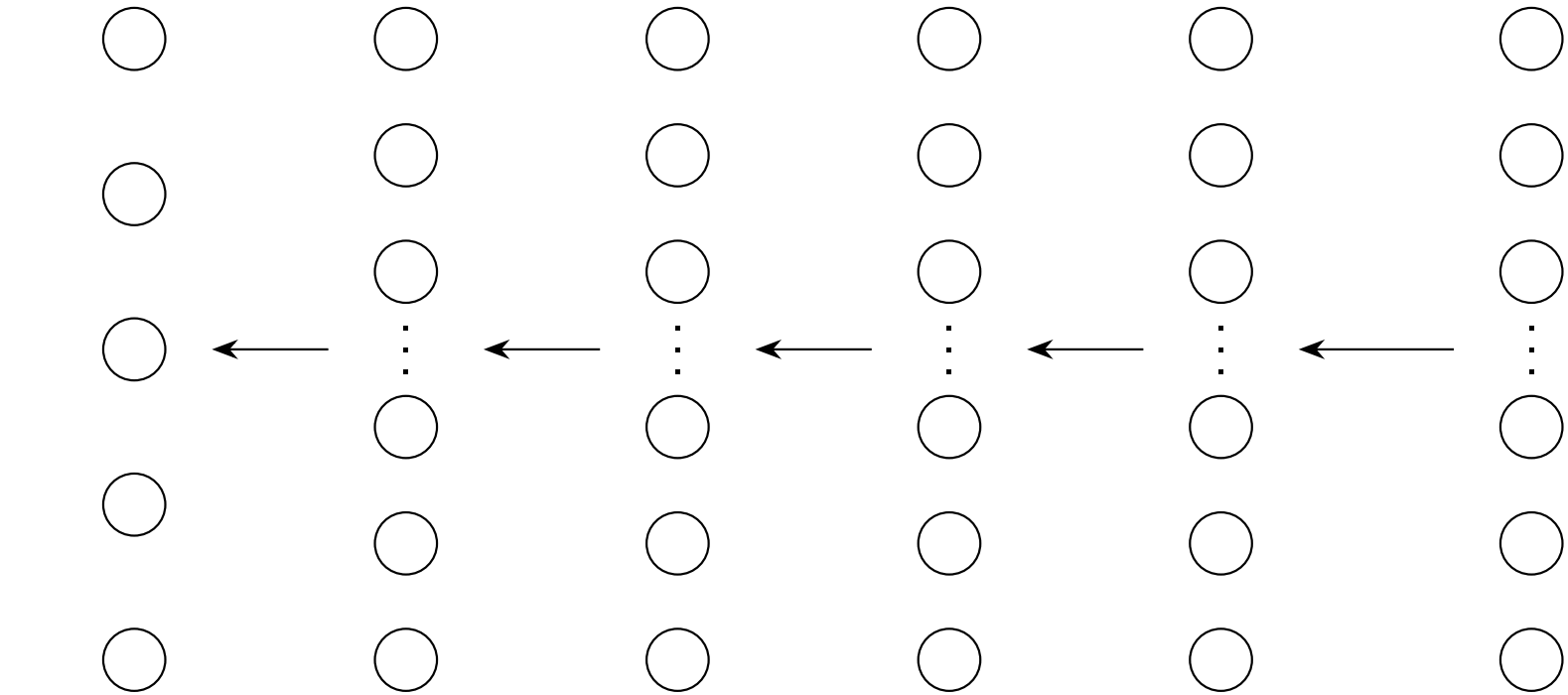
Obserables to Parameters

- Network
- Result

Network

- Optimizer:Adam
- Learning rate:0.0005
- Loss:The L2 norm of the absolute error between the predictions and the labels
- Batch size:Randomly choose 44 of 220
- Layers' type:FC with dropout(p=0.5),activation function:relu
- Training times:200000

Network


Parameter
256 units
256 units
256 units
256 units
Obserables

Result:Relative Error

表: Relative Rror

τ	σ	η/s	T_{sw}	K
0.053011	0.201948	1.538553	0.065286	0.059904

Reinforcement Learning

Studying something basic like Boltzmann's Equation, Fluid Mechanics...

Thank you for listening!