Artificial Intelligence in Education, Research and Development: TSU case-study

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WHAT SKILLS ARE NECESSARY SKILL IN THE ART AI AND ML: PORTRAIT OF A SPECIALIST?

THE STATE OF THE DATA SCIENTIST

TOP PRIMARY SKILLS
1. Data Analysis
2. R
3. Python
4. Data Mining
5. Machine Learning

TOP EDUCATIONAL BACKGROUNDS
1. Computer Science
2. Business Admin
3. Statistics
4. Mathematics
5. Physics

HIGHEST EDUCATION LEVEL
- Masters: 42%
- Bachelors: 20%
- PhD: 38%

INDUSTRY GROWTH
- # of Data Scientists growth: 2X
- Last 4 years

TOP INDUSTRIES EMPLOYING DATA SCIENTISTS
1. Information Technology & Services
2. Internet
3. Computer Software
4. Education
5. Banking & Financial Services
**THE MOST POPULAR DIGITAL EXPERTS**

The T-shaped Product Manager 2019 version

- **Product owner or Product manager**
- **Data scientist, Data engineer, Data analyst**
- **Java, IOS, and Android Developers**
- **UI / UX designers**
- **System analysts, blockchain experts, system architects**

According to superjob.ru
WHAT SKILLS ARE NECESSARY SKILL IN THE ART AI AND ML: PORTRAIT OF A SPECIALIST?
INSTITUTE OF APPLIED MATHEMATICS AND COMPUTER SCIENCE
ABOUT THE INSTITUTE

— Opened on 10.07.2017

— 114 university lecturers, 55 senior lecturer and 31 full professor

— 750 undergraduate and specialist students, 115 master's degree student and 70 PG student
MASTER'S DEGREE PROGRAMS

01.04.02 - Applied Mathematics and Computer Science:
Big Data & Data Science
Information Security
Data Processing, Management and Research of Stochastic Systems

02.04.02 – Fundamental Computer Science and Information Technology:
Immersive Technologies, Technical Vision and Video Analytics
Software Development in Industry 4.0

09.04.03 – Applied Computer Science:
Digitalization of State and Municipal Management / Financial Information Technologies

99 state-funded place
BACHELOR'S DEGREE PROGRAM

- Applied Mathematics and Computer Science
  Mathematical Methods in Economics
  01.03.02 – Applied Mathematics and Computer Science

- Artificial Intelligence and Software Development
  02.03.02 – Fundamental Computer Science and Information Technology

- DevOps-engineering in the Administration of the IT Development Infrastructure
  02.03.03 – Mathematical Support and Administration of Information Systems

- Software Development in The Digital Economy
  09.03.03 – Applied Computer Science

ENTRANCE EXAMS

- Mathematics (MIN 45)
- Computer Science (MIN 53)
- Russian Language (MIN 56)

182 state-funded place
214 - 241 passing score 2020
The known dependences of medical indicators in the field of cardiology lead to significant errors in predicting the size of the heart and are significant only with the average physique of the patient; therefore, it is relevant to develop mathematical models with an interval forecast that allow to qualitatively describe the complex functional data structure and determine the medical norm.
We evaluate to what extent this mechanism can describe the real data. Combining machine learning and social network analysis approaches, we retrieve a time series of VKontakte users’ opinions as well as information about friendship network connecting them. We state that this mechanism can approach the data a little worse than the best hyper-plane formed by a linear regression model.
**RESEARCH: AUGMENTED DATA & ANOMALY PATTERNS**

**Trend change** (e.g. performance decline of pump)

\[
\text{signal}[i] = \text{signal}[i] + \alpha \ast i.
\]

**Increase dispersion** (e.g. bearing vibration growth)

\[
\text{signal}[i] = \text{trend}[i] + \alpha \ast \text{noise}[i], \alpha > 1.
\]

**Decrease dispersion** (e.g. sensor failure)

\[
\text{signal}[i] = \text{trend}[i] + \alpha \ast \text{noise}[i], 1 > \alpha > 0.
\]

**Trend shift** (e.g. power surge)

\[
\text{signal}[i] = \text{signal}[i] + \text{shift}.
\]

**Add noise** (e.g. interference to signals)

\[
\text{signal}[i] = \text{signal}[i] + \text{noise}(0, \sigma).
\]

where $\alpha$-degree of anomaly
Process signals are:
- variable
- noisy
- non-stationary
- extremely hard to analyze by standard control systems or by any person.
Thanks for attention

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